Waterline, a Quarterly Industry Publication (1994+)

Waterline reports on the results of the Bureau's Port Interface Cost Index, port authority financial and non financial performance data, and stevedoring performance indicators. Although Waterline concentrates on containerised cargo and related issues, Waterline also reports on other waterfront issues to facilitate a more informed debate.

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WATERLINE

JULY 1994 ISSUE NO. 1

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

I am pleased to introduce *Waterline* — a biannual publication that will make available the results of the Bureau's continuing waterfront monitoring program.

A competitive waterfront is vital for an efficient domestic industry and for the competitiveness of Australian exports on the world market. For this reason, the waterfront has been an important focus of the Commonwealth Government's microeconomic reform program.

The Waterfront Industry Reform Authority (WIRA) monitored the progress of waterfront reform from June 1989 to September 1992, producing performance indicators at quarterly intervals. Since then, the waterfront has not been formally monitored. Yet, the waterfront remains the focus of often poorly informed criticisms. This is understandable given the complexity of the industry and the numerous participants involved — many with conflicting interests.

Therefore, there is a need to continue the monitoring of waterfront reform and disseminate this information in a sensible and practical way. *Waterline* will do this by including the results of the Bureau's *Port Interface Cost Index*, port authority financial and non financial performance data, and stevedoring performance indicators. Although *Waterline* concentrates on containerised cargo and related issues, *Waterline* will also report on other waterfront issues to facilitate a more informed debate.

Dr Maurice Haddad
Director

IN BRIEF

Price

Between 1990 and June 1993, average stevedoring charges fell by about 25 per cent.

The Bureau's *Port Interface Cost Index* shows that total waterfront charges per teu, between 1992 and 1993:

- fell by 3.5 per cent for imports, while
- exports remained steady for the same period.

The major changes in the index occurred in customs brokers' fees in the small ports and wharfage charges in Sydney.

Port Authority Performance

Total employment in the five major port authorities declined 17 per cent in 1992–93.

There has been a general improvement in the financial positions of the port authorities, helped by reduced debt servicing requirements. Significantly, the Port of Brisbane cleared itself of all debt.

Quality of Service

The national average container crane handling rate increased from 12.8 to 20.1 teus per gross hour between 1989 and September 1992. Recent figures indicate that this rate has essentially been maintained.

In the September 1993 quarter, the national average elapsed and net handling rates peaked at 23.4 teus per elapsed hour and 28.2 teus per net hour.

Undoubtedly there are still areas where improvements can be achieved. *Waterline* will provide an opportunity to discuss such issues.

THE PORT INTERFACE COST INDEX

In 1992, The House of Representatives Standing Committee 'Warehouse to Wharf' inquiry recommended that the Bureau produce a six monthly interface indicator to assess whether the port interface is becoming more efficient and assess whether the improvements in interface efficiency were being passed on to users in the form of lower costs.

Waterline presents the port interface cost indices for three six month periods from July 1992 to December 1993, including revised results for the period July to December 1992, which were previously reported by the Bureau (BTCE 1993). The indices for the periods January to June and July to December 1993 are provisional since data limitations have meant that the Bureau has been unable to update the 1992 ship and teu exchange data for the relevant ports in time for publication.

Although separate indices have been developed for each port, some care needs to be exercised when making inter-port comparisons. Different operating conditions will influence port costs and the degree of improvement that can be expected from the reform process.

Service quality is a dimension of port performance that cannot be included in the cost index. A low cost port is not necessarily consistent with acceptable service quality. Also, delay costs are not included in the index. For this reason it is more important to consider movements in individual port performance over time, rather than to make comparisons between ports at a particular point in time.

Detailed descriptions of the *Port Interface Cost Index* can be found in BTCE Report 84 (BTCE 1993).

Port and Related Charges

Port and related charges refer to all of the port authority charges on ships and cargo, and charges levied by other service providers to move a ship into and out of a port. These charges include: state government charges, pilotage, towage, tonnage, berth hire, mooring and unmooring, and wharfage.

Table 1 identifies the parameters used in calculating the index for each port.

To provide a realistic comparison of the impact of charges to shippers at each port, the Bureau uses an indicative ship for each port rather than using the same vessel and teu exchange for all ports.

One of the major issues in the debate about port authority charges is the appropriate balance between ship and cargo based charges. Therefore, in the index, port and related charges are categorised according to whether the charge is levied on the ship or the cargo. Ship based charges are for services provided by both port authorities and private sector companies, while only port authorities levy cargo based charges.

Table 2 contains the port and related charges for each port for the period July to December 1993. On a cost per teu basis, the figures show that cargo based charges still represent about 60 per cent of port and related charges.

Knowing the indicative number of containers exchanged per port call is important in understanding the impact that port charges have upon the cargo owners. At the smaller ports of Fremantle, Adelaide and Brisbane there is little difference between the ship based charges for a given ship size. However, there is substantial difference between these ports and the ports of Melbourne and Sydney. But at Sydney and Melbourne, there are typically more teus exchanged per ship call than at the other ports. The

TABLE 1 PARAMETER VALUES USED IN THE PORT INTERFACE COST INDEX, 1993

	Fremantle	Adelaide	Melbourne	Sydney	Brisbane
Vessel size					
GRT	17 215	13 488	17 215	17 215	20 325
NRT	8 372	6 126	8 372	8 372	7 769
LOA (metres)	–	–	176	–	201
Teus exchanged					
Total	385	440	684	826	485
Loaded	322	370	596	699	359
Empty	63	70	88	127	126
Loaded inwards	–	–	–	428	126
Loaded outwards	–	–	–	271	233
Total empty (% of total)	16	16	13	15	26
Loaded inwards (% of total)	–	–	–	52	–
Number of port calls	4	4	3	3	4
Handling rate (teus per elapsed hr)	18.2	–	–	–	25.6
Elapsed berth time (hrs)	21.15	30.32	35.21	–	18.95
Mooring time (hrs)	–	–	–	1.5	–
Unmooring time (hrs)	–	–	–	1	–

– *not required*

Note *The parameters used for the calculation of the 1993 charges are based on the ship and container exchange data from July to December 1992. This is not expected to have a substantial impact on the final indices.*

Source *BTCE estimates based on ship call data supplied by port authorities, and other port service providers.*

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higher teu exchange per port call offsets the higher ship based charges so that on a cost per teu basis, ship based charges for Sydney and Melbourne are comparable with the other ports (see table 2). Note that as the volume of teus exchanged increases, the difference between ship based charges per teu at the ports decreases.

Stevedoring Charges

As a consequence of the Inquiry Into Charges by the Stevedoring and Container Depot Industries (PSA 1990), the Prices Surveillance Authority (PSA) was given the task to monitor stevedoring charges on a continuing basis.

Using a sample drawn from the stevedoring companies in Sydney, Melbourne and Fremantle, the monitoring program represents approximately 35 per cent of all the Australian container terminal throughput.

The PSA's latest report suggests that the strong downward movement in nominal expenses and revenue since 1990 may have concluded as the process of stevedoring workforce reduction is now essentially complete. This resulted in a 25 per cent reduction in stevedoring charges, from $254 per teu in 1990 to $190 per teu for the first half of 1993. Nevertheless, the PSA considers that there may still be scope for efficiency gains to be made through continuing reforms and effective capital investment (PSA 1994, 2).

However, the Authority does not suggest to what extent any future realised efficiency gains would influence present cost levels.

Although average revenue received by stevedores has remained unchanged over the previous six months, average expenses per teu have increased from $186 to $191 per teu. As average costs exceeded average revenue for the first half of 1993, there may be some upward pressure on stevedoring charges in the coming period.

TABLE 2 PORT AND RELATED CHARGES, JULY TO DECEMBER 1993

($/teu)

	Fremantle	Adelaide	Melbourne	Sydney	Brisbane
Ship based charges					
State government	2.05	3.51	4.67	–	7.67
Berth hire	–	–	6.17	–	2.78
Tonnage	5.54	9.95	14.85	11.25	–
Pilotage	13.16	4.14	6.94	4.52	10.58
Towage	30.08	25.77	10.75	11.83	24.49
Mooring and unmooring	3.65	–	3.44	5.38	0.70
Total ship based charges	54.49	43.37	46.81	32.99	46.22
Cargo based charges					
Wharfage	49.20	79.00	55.00		26.00
Imports				65.00	
Exports				50.00	
Harbour dues	–	–	–	–	42.00
Berthing	14.46	–	–	–	–
Total port and related charges					
Imports	118.15	122.37	101.81	97.99	114.22
Exports	118.15	122.37	101.81	82.99	114.22

– *not applicable*

Note *Provisional results. July to December 1993 charges based on the ship and container exchange data from July to December 1992.*

Source *BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers.* BTCE

Land Based Charges

The land based charges included in the index are customs brokers' fees for the clearance of containers through customs, and road transport charges for the carriage of containers between the wharf and warehouse (see table 3).

The most significant changes in the index between July to December 1992 and the corresponding period in 1993 were a 50 per cent reduction in the customs brokers' fees for import clearances in the ports of Fremantle and Adelaide and the 13 per cent reduction in the same charge in Brisbane (see figure 1).

It was suggested to the Bureau that the downward movement in custom brokers' fees is a direct result of the introduction of the optional port of lodgement system in September 1993. Previously, customs entry fees were paid to the Australian Customs Service at the port of entry. As the name suggests, this fee is now payable at any port.

Consequently, there may now be an increase in the proportion of clearances lodged in Melbourne and Sydney, where there has been no change in fees.

Movements in the Index

Figure 1 indicates the changes in the index between July–December 1992 and July–December 1993, by port.

Significantly for the cargo owners, the most substantial changes to charges that have occurred (customs brokers' fees and wharfage charges) are those normally paid directly by the shipper. Therefore the benefits of price reductions over the last 18 months recorded in the index have flowed directly to shippers.

Figure 2 highlights the relative significance of each of the components of the *Port Interface Cost*

TABLE 3 SHORE BASED SHIPPING COSTS, JULY TO DECEMBER 1993
($/teu)

	Fremantle	Adelaide	Melbourne	Sydney	Brisbane
Imports					
Ship based charges	54	43	47	33	46
Cargo based charges	64	79	55	65	68
Stevedoring	190	190	190	190	190
Customs brokers' fees	71	71	152	147	125
Road transport	165	137	244	275	175
Total imports	544	520	687	710	604
Exports					
Ship based charges	54	43	47	33	46
Cargo based charges	64	79	55	50	68
Stevedoring	190	190	190	190	190
Customs brokers' fees	71	71	91	89	97
Road transport	165	137	244	275	175
Total exports	544	520	626	637	576

Note *1993 charges based on the ship and container exchange data from July to December 1992.*

Source *BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers, survey of customs brokers and road transport operators, and PSA (1994).*

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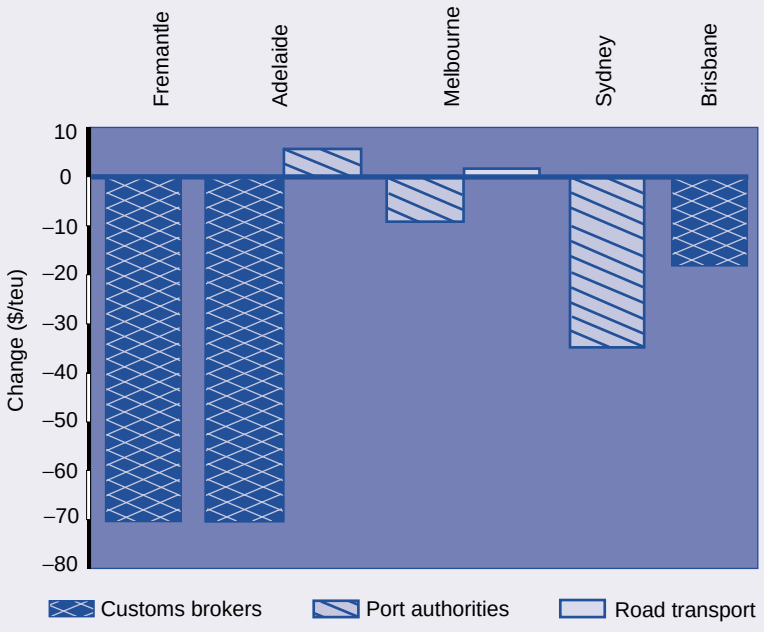
Index, particularly land based charges. Customs brokers' fees and road transport charges account for between 45 per cent (Fremantle and Adelaide) and 60 per cent (Melbourne and Sydney) of the total shore based shipping bill. Add to this a further 25 to 35 per cent for stevedoring charges and the result is that between 75 and 85 per cent of total shore based shipping costs are accounted for by just three types of service providers.

FIGURE 1 SOURCES OF CHANGES IN THE INDEX BETWEEN JULY TO DECEMBER 1992 AND JULY TO DECEMBER 1993



Source *BTCE estimates based on price schedules of port authorities, towage operators and pilotage service providers, survey of customs brokers and road transport operators, and PSA (1994).*

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Consequently, significant changes in the individual port and national indices will not occur without a movement in the charges for stevedoring, customs clearances and road transport services. This is reflected in table 4 where only the national index for imports declined significantly between 1992 and 1993.

The direct influence that port authority charges have upon total shore based shipping costs is outweighed by the charges levied by other service providers.

However, port authority charges and regulations also influence the cost structures of the other port service providers.

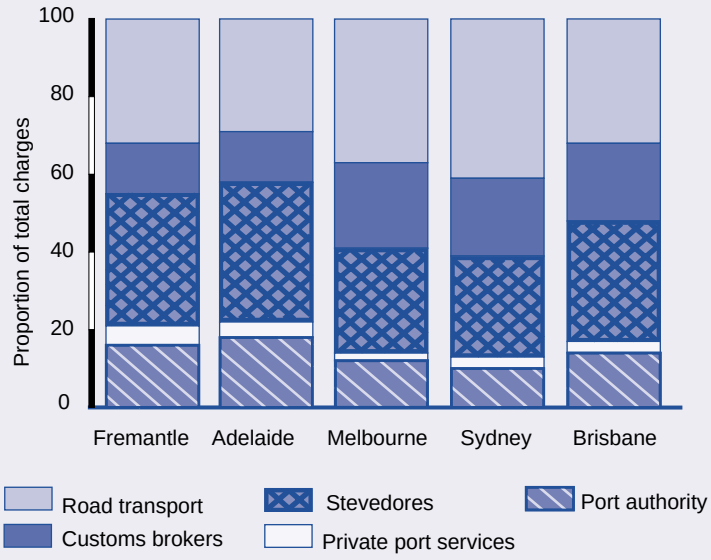
PORT AUTHORITY PERFORMANCE INDICATORS

Table 5 illustrates the 1992–93 financial performance of the mainland capital city port authorities. All of these authorities had improved financial performance during 1992–93 compared with 1991–92. There are two major reasons for the improved performance.

Firstly, all of the authorities were able to reduce costs through improved efficiency in their operations and reductions in wage and salary costs. The reductions in wage and salary costs were due to the 17 per cent reduction in the number of people employed in the five port authorities during 1992–93.

Secondly, with the exception of Brisbane, port throughput increased in 1992–93. This generally led to increased

FIGURE 2 DISTRIBUTION OF PORT INTERFACE COSTS, JULY TO DECEMBER 1993



Source *BTCE estimates based on price schedules of port authorities, towage operators and pilotage service providers, survey of customs brokers and road transport operators, and PSA (1994).*

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revenue. Brisbane had a reduced cargo throughput due to drought affected grain exports and reduced coal exports as a consequence of unfavourable commodity markets. However, these reductions were partially offset by increased container volumes.

Significantly, both the then South Australian Department of Marine and Harbors (SA DM&H) and Fremantle Port Authority (FPA) have very high debt levels. Additionally, the FPA has negative equity but was still required to make a payment to the Western Australian State Government in 1992–93, even though the port had made a net loss.

The fall in interest rates during 1992–93 meant that port authorities with large amounts of debt had lower interest payments. Also, the generally improved financial performance allowed most port authorities to reduce their level of debt. The FPA was one exception, finding it necessary to increase its short term borrowings to satisfy its cash flow requirements. Significantly, the Port of Brisbane Authority has now retired all of its financial debt.

In addition to dividends paid, the Sydney Ports Authority contributed $10.051m towards the MSB's agreed return of capital to the New South Wales Treasury.

The Port of Melbourne Authority (PMA) has the lowest rate of return on assets in table 5. However, in contrast to most port authorities, the PMA's results are expressed in current cost terms. When expressed in historic cost terms, the PMA's return on assets is 11.6 per cent. The FPA publishes its financial accounts in current cost terms as well as in historic terms. The FPA's real rate of return on assets for 1992–93 was 1.05 per cent, compared with the 10.5 per cent in historic cost terms.

Table 6 provides additonal port authority performance data.

STEVEDORING PERFORMANCE INDICATORS

WIRA's gross and crane rates are not strictly comparable with the new net and crane rates, respectively (see page 10 of this issue for more detailed definitions). Throughout *Waterline*, the post September 1993 terms are used when referring to both the WIRA indicators and the latest data — that is, the WIRA data have not been adjusted. This is not expected to have a major impact on the analysis.

On average, during the WIRA period, the productivity measures at the five main ports remained steady until mid 1991 (see figure 3). This was due to the nature of the initial reform process, as stakeholders negotiated and then implemented the new work practices and conditions contained in the enterprise agreements (EAs).

TABLE 4 THE NATIONAL PORT INTERFACE COST INDEX
($/teu)

	2nd half 1992	1st half 1993	2nd half 1993	Change[1](%)
Imports	691	677	667	–3.47
Exports	613	610	610	–0.01

1 Percentage change over the three periods

Note 1993 charges based on the ship and container exchange data from July to December 1992.

Source BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers, survey of customs brokers and road transport operators, and PSA (1994).

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With the introduction of EAs, crane productivity increased. This effectively resulted in increased crane capacity and allowed terminal operators to increase the average number of cranes used per ship (crane intensity). The greater crane intensity resulted in some ports experiencing rapid productivity improvements as measured by the net rate (see Sydney's net rate in figure 5).

As a result of the WIRA reform program, national average container crane handling rates increased from 12.8 teus per hour, in 1989, to 20.1 teus per hour in September 1992. In broad terms, these gains have since been sustained.

TABLE 5 PORT AUTHORITY FINANCIAL PERFORMANCE INDICATORS, 1992–93[1]

Indicator	Port of Brisbane Authority	MSB Sydney Ports Authority	Port of Melbourne Authority[2]	Department of Marine and Harbors[2]	Fremantle Port Authority
			($ '000)		
EBIT[3]	32 604	61 815	38 589	22 264	9 173
Assets in service[4]	185 088	340 094	791 074	214 604	87 579
Dividends paid	7 257	32 416	5 000	0	1 050
Operating profit[5]	32 009	62 887	22 170	6 080	–1 536
Total debt	0	55 753	273 348	136 130	72 789
Total equity	170 953	183 543	441 060	68 472	–37 698
			per cent		
Return on assets[6]	17.6	18.2	4.9	10.4	10.5
Dividend payout ratio[7]	22.7	51.5	22.6	0.0	–68.4
Debt to equity ratio[8]	0.0	30	62	199	–193

1 *PMA financial accounts are current account based rather than historical account*
2 *Commercial operations only*
3 *Earnings before interest and tax, excluding abnormals*
4 *Average total assets for the financial year*
5 *Includes abnormals*
6 *EBIT as a proportion of total assets*
7 *Dividends paid out as a proportion of operating profit*
8 *Total debt as a proportion of total equity*

Source AAPMA.

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The most recent five port aggregated data indicates an average productivity decline in the December 1993 quarter. This drop is mostly attributable to the decline in productivity at Melbourne. In the last quarter of 1993, Melbourne experienced a significant deterioration in productivity by all measures (see figure 6). The decline in performance at Melbourne was due to the redevelopment of the Conaust terminal, and a difficult industrial climate that was being experienced by both major stevedoring companies.

The ports of Brisbane and Sydney experienced minor decreases in both the elapsed and net handling rates in the December 1993 quarter. Since there was little change in the crane rates at these two ports, this decline was possibly due to a decrease in crane intensity as a result of an increase in the number of ships entering these ports.

In contrast, productivity increases for the same period were experienced at Adelaide and Fremantle, although these rates have slipped below the previous WIRA peak levels.

TABLE 6 NON-FINANCIAL PERFORMANCE INDICATORS, MAJOR AUSTRALIAN PORTS, JULY TO DECEMBER 1993

	Unit	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Five ports
Turnaround time							
Median	hrs	28.0	42.0	44.5	27.5	28.0	–
95th percentile	hrs	54.0	115.0	82.5	46.5	101.0	–
Berth occupancy	%	35	43	41	12	27	–
Port authority employees	average totals	231	446	497	364	360	1898
Mean delay due to industrial stoppages	hrs per ship visit	na	na	1.5	0.0	na	–
Total port throughput	'000 tonnes	8 408	9 669	6 953	2 382	9 365	36 777
General cargo throughput[1]	tonnes	303 579	560 517	923 425	167 461	276 261	2 231 243
Teus exchanged							
Full imports	teu	32 527	155 446	179 557	7 609	32 065	407 204
Empty imports	teu	22 990	8 950	28 299	7 371	9 142	76 752
Full exports	teu	53 675	101 351	158 949	14 556	34 033	362 564
Empty exports	teu	3 914	36 886	35 668	1 278	4 681	82 427
Total	teu	113 106	302 633	402 473	30 814	79 921	928 947

– *not applicable*
na *not available*

1 *Non containerised, excluding bulk cargoes*

Source AAPMA.

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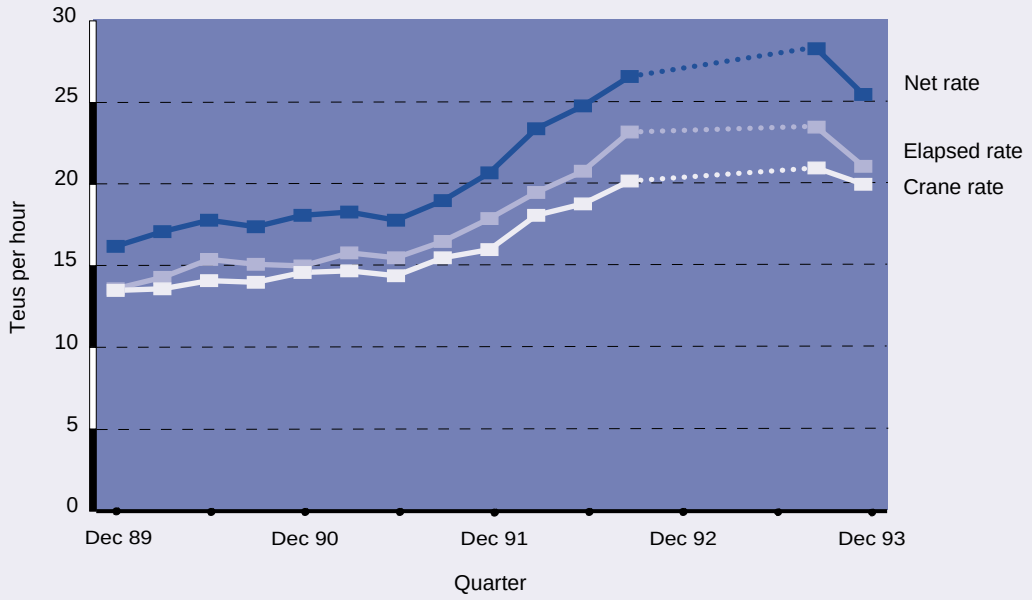
FIGURE 3 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. See text for explanation. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores, Conaust and SeaLand.*

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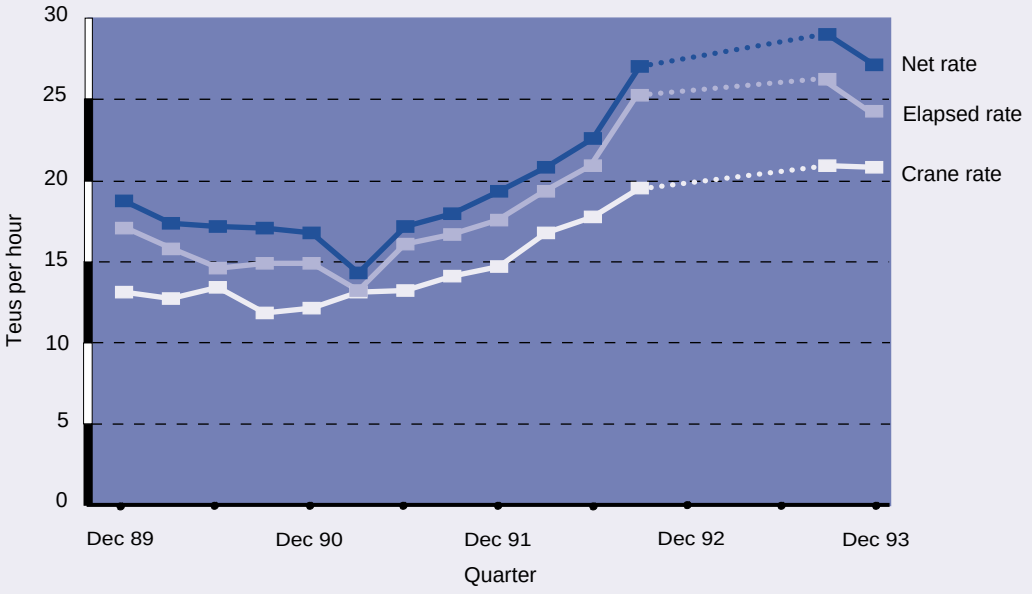
FIGURE 4 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. See text for explanation. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust.*

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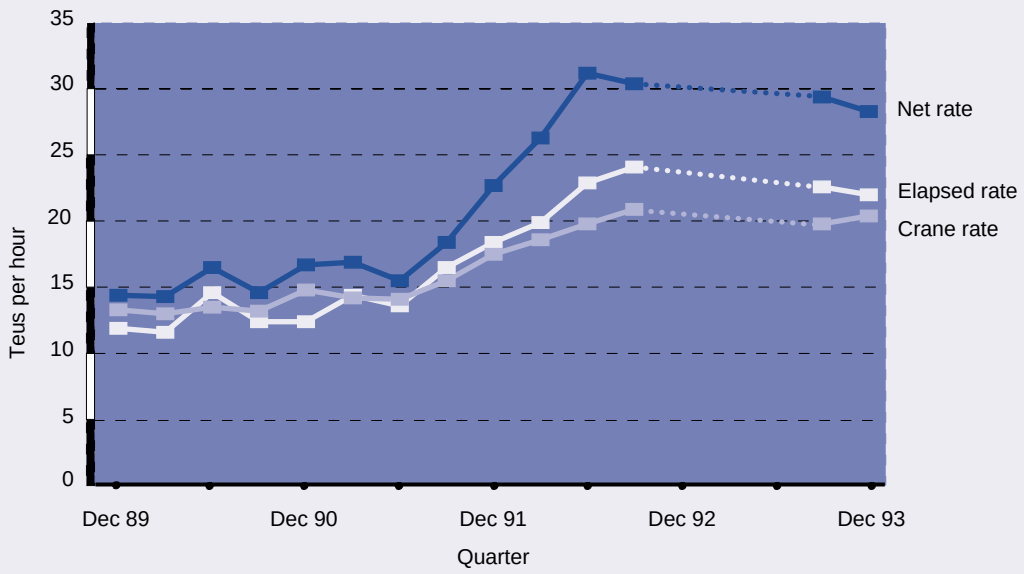
FIGURE 5 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. See text for explanation. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust*

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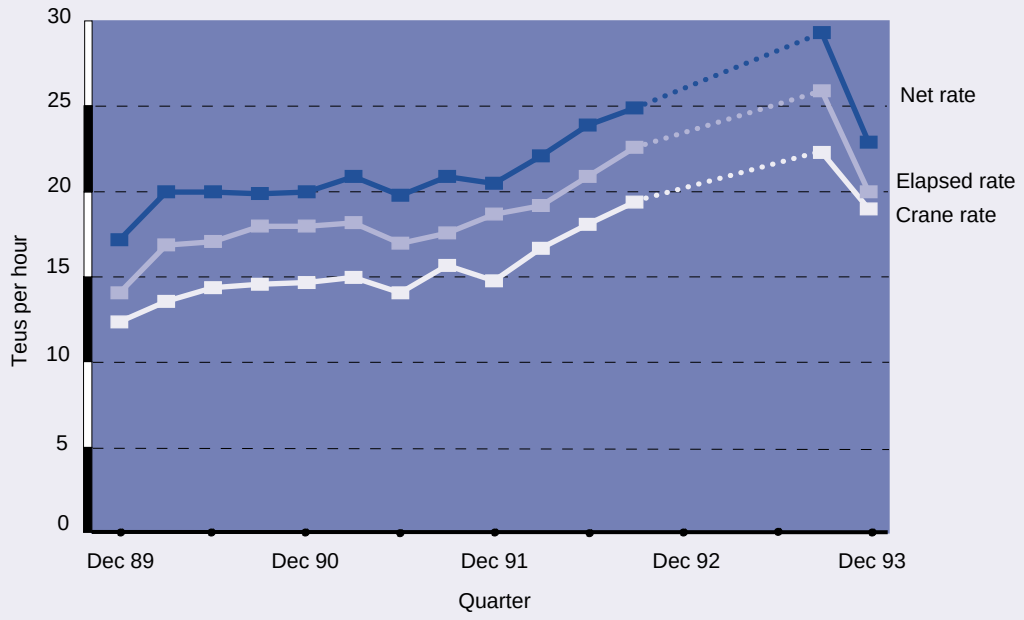
FIGURE 6 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. See text for explanation. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust.*

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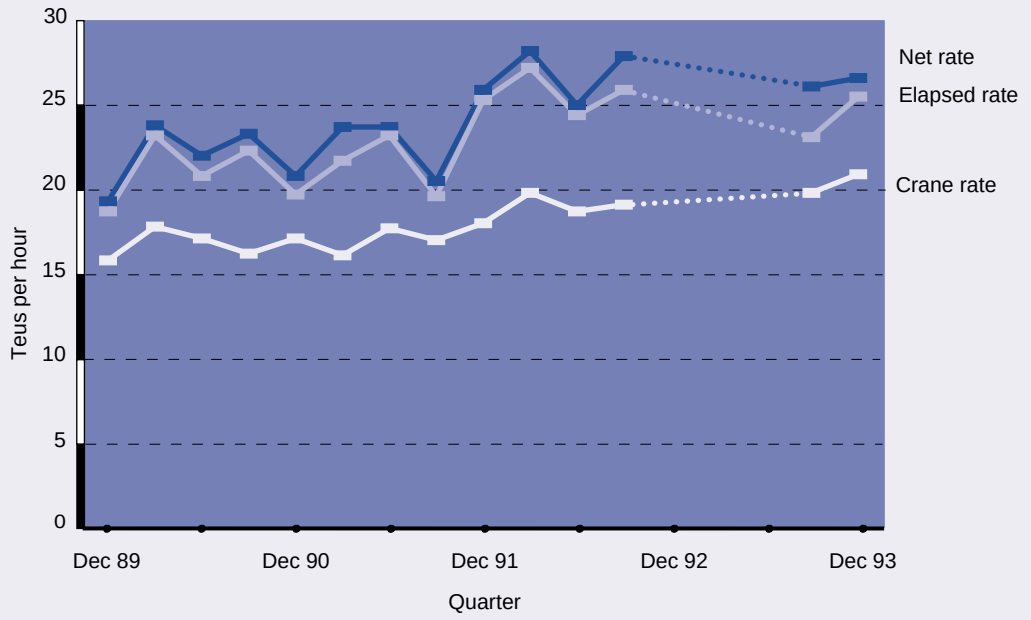
FIGURE 7 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. See text for explanation. Data unavailable for December 1992 to June 1993.*

Source *WIRA, and SeaLand.*

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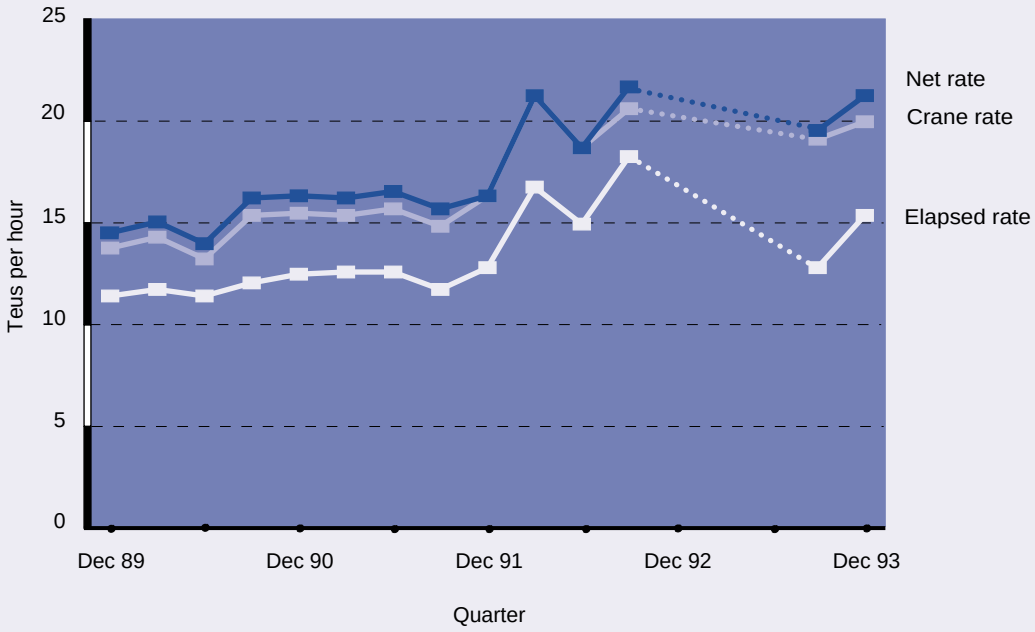
FIGURE 8 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. See text for explanation. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust.*

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Figure 4 shows that the net and elapsed handling rates at Brisbane have remained consistently close. This tends to indicate that there is little delay between the time the vessel is available to be worked and actually being worked.

Over the period 1989 to 1992, crane rates at Adelaide (figure 7) increased by 24 per cent — the smallest increase of the five major ports. However, Adelaide started from a higher base figure than the other ports and its rate in December 1993 was the second highest of the five ports measured. The similarity between the net rate and the elapsed rate indicates that there is little stoppage time at Adelaide.

Interestingly, crane rates at the five major ports converge to around 20 teus per hour by December 1993, whereas comparison of net handling rates shows that while these rates have followed a positive trend they have remained dispersed over the period studied.

STEVEDORING PERFORMANCE INDICATOR DEFINITIONS

The following definitions of stevedoring performance indicators were used by WIRA:

- **Elapsed time** — the total time the ship is alongside the berth offering for work, whether worked or not, measured from labour first ordered to last labour ashore
- **Gross time** — the elapsed time minus the time unable to work the ship due to ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at shipowner's request
- **Crane rate** — the number of teus moved per crane gross hour

From September 1993 the following definitions are used:

- **Elapsed time** — as defined by WIRA
- **Net time** — WIRA's gross time less award shift breaks
- **Crane rate** — the number of teus moved per crane in net hours

Abbreviations

AAPMA	Association of Australian Ports and Marine Authorities
AGPS	Australian Government Publishing Service
BTCE	Bureau of Transport and Communications Economics
EA	Enterprise agreement
FPA	Fremantle Port Authority
GRT	Gross registered tonnage
LOA	Length overall
MSB	Maritime Services Board of New South Wales
NRT	Net registered tonnage
PMA	Port of Melbourne Authority
PSA	Prices Surveillance Authority
SA DM&H	South Australian Department of Marine and Harbors
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

References

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PSA 1990, *Inquiry into Charges by Stevedoring and Container Depot Industries*, Report 34, PSA, Melbourne.

PSA 1994, *Monitoring of Stevedoring Costs and Charges*; Number 3, Monitoring Report No. 16, PSA, Melbourne.

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TABLE 7 CONTAINER TERMINAL PERFORMANCE INDICATORS, MAJOR AUSTRALIAN PORTS, DECEMBER 1989 TO DECEMBER 1993

Port	Dec 89	Mar 90	Jun 90	Sep 90	Dec 90	Mar 91	Jun 91	Sep 91	Dec 91	Mar 92	Jun 92	Sep 92	Dec 92	Mar 93	Jun 93	Sep 93	Dec 93
Brisbane																	
Ships handled	51	60	63	70	88	75	89	91	91	85	96	93	na	na	na	106	111
Total teus	25 797	26 235	24 544	27 628	32 705	23 203	33 845	38 074	36 021	28 235	39 058	45 055	na	na	na	49 622	46 529
Crane rate	13.3	12.9	13.6	12.0	12.3	13.3	13.4	14.3	14.9	17.0	18.0	19.8	na	na	na	21.2	21.1
Elapsed rate	17.3	16.0	14.8	15.1	15.1	13.4	16.3	16.9	17.8	19.6	21.2	25.6	na	na	na	26.6	24.6
Net rate	19.0	17.6	17.4	17.3	17.0	14.5	17.4	18.2	19.6	21.1	22.9	27.4	na	na	na	29.4	27.5
Sydney																	
Ships handled	93	110	107	108	119	107	114	109	109	105	109	112	na	na	na	205	238
Total teus	69 290	62 793	61 153	60 257	69 975	55 012	58 075	67 601	72 250	71 702	68 359	81 287	na	na	na	124 028	139 321
Crane rate	13.3	13.0	13.5	13.2	14.8	14.2	14.1	15.5	17.5	18.6	19.8	20.9	na	na	na	19.8	20.4
Elapsed rate	11.9	11.6	14.6	12.4	12.4	14.4	13.6	16.5	18.4	19.9	22.9	24.1	na	na	na	22.6	22.0
Net rate	14.4	14.3	16.5	14.6	16.7	16.9	15.5	18.4	22.7	26.3	31.2	30.4	na	na	na	29.4	28.3
Melbourne																	
Ships handled	106	117	118	132	143	131	117	113	125	108	121	121	na	na	na	235	306
Total teus	82 612	71 825	70 253	84 043	81 978	72 632	73 921	75 427	95 019	73 441	82 757	86 486	na	na	na	129 687	143 350
Crane rate	12.4	13.6	14.4	14.6	14.7	15.0	14.1	15.7	14.8	16.7	18.1	19.4	na	na	na	22.3	19.0
Elapsed rate	14.1	16.9	17.1	18.0	18.0	18.2	17.0	17.6	18.7	19.2	20.9	22.6	na	na	na	25.9	20.0
Net rate	17.2	20.0	20.0	19.9	20.0	20.9	19.8	20.9	20.5	22.1	23.9	24.9	na	na	na	29.3	22.9
Adelaide																	
Ships handled	23	23	(24)	(18)	29	25	19	20	21	22	20	21	na	na	na	21	26
Total teus	9 295	9 461	(9 389)	(7 516)	10 971	11 572	9 402	9 442	10 998	10 810	10 710	10 763	na	na	na	9 650	12 616
Crane rate	15.8	17.8	(17.1)	(16.2)	17.1	16.1	17.7	17.0	18.0	19.8	18.7	19.1	na	na	na	19.8	20.9
Elapsed rate	18.7	23.2	(20.8)	(22.3)	19.7	21.7	23.2	19.6	25.3	27.2	24.4	25.9	na	na	na	23.1	25.5
Net rate	19.3	23.8	(22.0)	(23.3)	20.8	23.7	23.7	20.5	25.9	28.2	25.0	27.9	na	na	na	26.1	26.6
Fremantle																	
Ships handled	69	64	66	72	66	68	74	76	77	71	75	72	na	na	na	116	115
Total teus	24 380	22 362	19 411	22 339	21 567	23 696	21 205	22 713	26 522	25 403	26 572	27 690	na	na	na	37 566	40 910
Crane rate	14.0	14.5	13.5	15.5	15.6	15.8	15.5	15.0	16.4	21.0	18.6	20.4	na	na	na	19.0	19.8
Elapsed rate	11.8	12.1	11.8	12.4	12.8	12.9	12.9	12.1	13.1	16.8	15.1	18.2	na	na	na	13.1	15.5
Net rate	14.7	15.2	14.2	16.3	16.4	16.6	16.3	15.8	16.4	21.0	18.6	21.4	na	na	na	19.4	21.0
Five ports																	
Ships handled	342	374	378	400	445	406	413	409	423	391	421	419	na	na	na	683	796
Total teus	211 374	192 676	184 750	201 783	217 196	183 624	198 939	213 257	240 810	209 591	227 456	251 281	na	na	na	350 553	382 726
Crane rate	13.4	13.5	14.0	13.9	14.5	14.6	14.3	15.4	15.9	18.0	18.7	20.1	na	na	na	20.9	19.9
Elapsed rate	13.5	14.2	15.3	15.0	14.9	15.7	15.4	16.4	17.8	19.4	20.7	23.1	na	na	na	23.4	21.0
Net rate	16.1	17.0	17.7	17.3	18.0	18.2	17.7	18.9	20.6	23.3	24.7	26.5	na	na	na	28.2	25.4

na not available

( ) approximate, calculated from the five port average

Source WIRA, and Australian Stevedores, Conaust and SeaLand container terminal operators.

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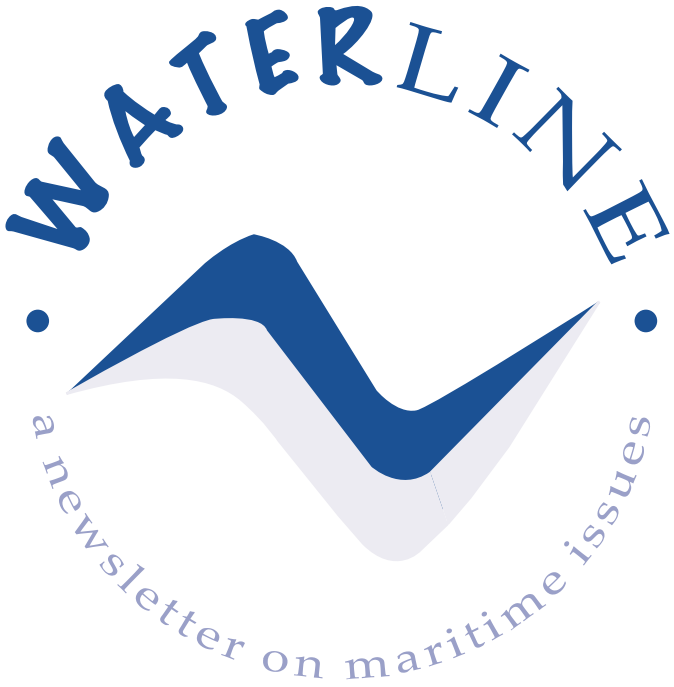

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AUSTRALIA

WATERLINE

DECEMBER 1994 ISSUE NO. 2

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

IN BRIEF

Port Interface Cost Index

With the exception of Melbourne, the cost of moving international containers in Australia's mainland container ports has generally increased on a per teu basis. These cost increases were due mainly to a reduction in the number of containers exchanged per port call.

The port indices for Adelaide and Fremantle were also affected by an increase in custom brokers' fees for import containers. At Melbourne, shore based shipping costs decreased on a per teu basis for the first half of 1994 due to the elimination of berth hire charges at East Swanson Dock.

Since the second half of 1992 shore based shipping costs have decreased by 3.8 per cent in real terms for imports and decreased marginally for exports.

Port Authority Performance

Port authority employment in the five major ports decreased by 281 or 15 per cent during the first half of 1994 compared with the second half of 1993.

Throughput of non-containerised general cargo decreased by 6 per cent. Although there was a small decrease in the number of containers exchanged compared with the July to December period of 1993, the total number of containers handled by the five ports reached record levels during 1993–94 (1.85 million teus). At Melbourne throughput exceeded 800 000 teus.

The average number of containers exchanged per port call is an important parameter for calculating the impact of ship based charges upon the cargo owner. Ship based charges per teu move in the opposite direction to charges in teus exchanged per port call. Therefore, it is important to note that although there were no changes to ship based charges at Brisbane or Sydney, a reduction in the average cargo exchange resulted in an increase in the per teu port and related charges reported in table 2.

Quality of Service

The industrial dispute of February–March disrupted the operations of Australian Stevedores during the first half of 1994. The dispute had a major effect on Sydney terminal performance. The redevelopment of West Swanson Dock also had an adverse effect on Melbourne container terminal performance.

Elapsed handling rates on a five port average (19.6 teus per hour), were below those reported for the second half of 1993, reflecting the effect of the disruptions during the period under review. Net handling rates for the five ports (25 teus per hour) were consistent with those achieved in the December quarter of 1993.

Stevedoring performance is still well above the pre-WIRA levels, but significantly below the levels achieved in the September quarter of 1993. Clearly there is considerable scope for improved performance.

PORT INTERFACE COST INDEX

Amendments to the Index for July to December 1993

The values of the *Port Interface Cost Index* reported in the first issue of *Waterline* were provisional pending updating of ship size and teu exchange parameters. These parameters have now been updated. The effect on the representative ship was to increase the size for Adelaide and reduce the ship size for Brisbane so that all ports now have the same representative ship of 17 215 grt.

The amended number of teus exchanged per ship call for the second half of 1993 is less than that used in the previous issue of *Waterline*. The effect of the amendment is to increase the estimated ship based charges. Because these charges are based on the size of the ship and not the volume of cargo exchanged, a reduction in the number of teus exchanged increases the cost per teu to the ship owner of bringing the ship into the port. The amended July to December parameters are shown in table 1.

The revisions had the largest effect on Adelaide charges. The effect is more pronounced in Adelaide because the reduced teu exchange was accompanied by an increase in the size of the representative ship. In Brisbane the effect of the reduced teu exchange was largely offset by a reduction in the size of the representative ship.

A further amendment was necessary to reflect the PSA updating of its estimates of stevedoring charges for the second half of 1993. The new estimate of $195 is $5 per teu more than the provisional estimate and affected all ports equally. The amended July to December changes are shown in table 2.

The effect of the revision has been to increase the national index for July to December 1993 for imports to $677 (previously $667) and to $620 for exports (previously $610). PSA revisions to estimates of stevedoring charges account for $5 of the increase and changes in ship and teu parameters account for the rest.

Port Interface Cost Index for January to June 1994

Compared with the period July to December 1993, teus exchanged per port call for the representative vessel decreased for all ports except Adelaide. The representative ship size remained the same as the revised size for the previous half year. The parameters for January to June 1994 as well as the revised parameters for June to December 1993 are shown in table 1.

Port and Related Charges

Port and related charges are those charges levied on the ship and the cargo by port authorities, towage operators,

TABLE 1 PARAMETERS USED IN THE PORT INTERFACE COST INDEX

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	July–Dec 93	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*
Vessel size										
GRT	17 215	17 215	17 215	17 215	17 215	17 215	17 215	17 215	17 215	17 215
NRT	8 372	8 372	8 372	8 372	8 372	8 372	8 372	8 372	8 372	8 372
LOA (metres)	176	176	–	–	176	176	–	–	–	–
Teus exchanged[1]										
Total	406	354	717	613	676	665	253	282	316	299
Loaded	300	269	607	514	589	561	213	237	264	246
Empty	106	85	110	99	87	104	40	45	52	53
Loaded inwards	105	94	372	310	–	–	75	83	–	–
Loaded outwards	195	175	235	204	–	–	138	154	–	–
Primary produce	–	–	–	–	–	–	42	46	–	–
Total empty (% of total)	26	24	15	16	13	16	16	16	16	18
Loaded inwards (% of total)	–	–	52	52	–	–	–	–	–	–
Number of port calls[1]	3	3	3	3	3	3	2	2	5	5
Elapsed berth time (hrs)[1]	22	21	–	–	40	38	18	18	28	25
Mooring time (hrs)	2	2	1.5	1.5	–	–	–	–	–	–
Unmooring time (hrs)	2	2	1	1	–	–	–	–	–	–

– *not required*
1 *Mean value for ships between 15 000 and 20 000 grt*

Source BTCE estimates based on ship call data supplied by port authorities, and other port service providers.

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TABLE 2 PORT AND RELATED CHARGES

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	July–Dec 93	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*	*July–Dec 93*	*Jan–Jun 94*
Ship based charges										
State government	7.76	8.90	–	–	4.72	4.80	9.19	7.68	2.50	2.65
Berth hire	2.90	3.33	–	–	7.07	–	–	–	–	–
Tonnage	–	–	12.97	15.16	15.02	15.27	15.60	14.00	9.00	8.64
Pilotage	12.63	14.49	5.21	6.09	8.11	8.25	9.29	8.33	7.83	8.27
Towage	25.71	29.49	13.63	15.94	10.87	11.05	48.62	43.62	36.65	38.73
Mooring and unmooring	2.47	2.84	6.20	7.26	3.48	3.53	–	–	4.45	4.70
Total ship based charges										
$/teu	51.49	59.05	38.00	44.45	49.28	42.91	82.70	73.63	60.43	62.99
$/visit	20 903	20 903	27 248	27 248	33 314	28 534	20 922	20 763	19 095	18 833
Cargo based charges										
Wharfage	26.00	26.00			55.00	55.00			49.20	49.79
Imports			65.00	65.00			79.00	75.00		
Exports			50.00	50.00			70.54	67.74		
Harbour dues	42.00	42.00	–	–	–	–	–	–	–	–
Berthing	–	–	–	–	–	–	–	–	14.46	14.63
Total port and related charges										
Loaded imports	124.09	127.05	103.00	109.45	104.28	97.91	161.70	148.63	124.09	127.41
Loaded exports	124.09	127.05	88.00	94.45	104.28	97.91	153.24	141.37	124.09	127.41
Empties	78.67	73.30	73.00	79.45	65.28	58.91	82.70	73.63	78.67	81.45

– *Not applicable*

Note *Port and related charges based on the parameters described in table 1.*

Source *BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service.*

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pilots and state governments. Charges levied on the ship are usually fixed and are dependent on the size of the ship. The cost per teu of these charges is therefore sensitive to the number of containers exchanged. The general decrease in teus exchanged was most marked in Sydney, where the decrease of 15 per cent led to an increase of $6.45 per teu in ship based charges.

At the opposite end of the spectrum, Adelaide ship based charges decreased by $9.07 per teu. This decrease was the result of a 11 per cent increase in teus exchanged per ship call and a reduction of 9 per cent in the Navigation Services Charge.

Melbourne also achieved a small decrease in ship based charges. The effect of the decrease in teus exchanged was more than offset by the removal of berth hire charges at East Swanson Dock.

At Fremantle, the reduction in tonnage charges was not sufficient to offset the effect of a reduction in teus exchanged.

Towage costs stand out as the major difference in ship based charges between the ports. If towage charges are ignored, the remaining ship based charges differ by less than $8 per teu between the five ports. The impact of towage charges reflects the higher charges required to maintain a viable towage service in relatively low shipping volume ports.

A summary of the port and related charges is shown in table 2. The cargo based charges remain largely the same as for the previous period, except for a decrease of $4 in Adelaide wharfage charges. Adelaide export wharfage charges in table 2 reflect the discount provided to horticultural exports. Total port and related charges per teu are lowest in Sydney and Melbourne and highest in Adelaide.

Stevedoring Charges

The stevedoring charges used in this issue of *Waterline* are those published in the most recent PSA report on stevedoring prices (PSA 1994). As these prices refer to the second half of 1993, they will need revision when the PSA publishes its results for 1994.

The PSA found there had been a small increase in revenue per teu in the second half of 1993. During the same period there was a further fall of 6 per cent in expenses per teu mainly due to increased throughput of containers compared with the

TABLE 3 SHORE BASED SHIPPING COSTS, JANUARY TO JUNE 1994

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	July–Dec 93	Jan–Jun 94	July–Dec 93	Jan–Jun 94	July–Dec 93	Jan–Jun 94	July–Dec 93	Jan–Jun 94	July–Dec 93	Jan–Jun 94
Imports										
Ship based charges	51	59	38	44	49	43	83	74	60	63
Cargo based charges	68	68	65	65	55	55	79	75	64	64
Stevedoring	195	195	195	195	195	195	195	195	195	195
Customs brokers' fees	125	133	147	147	152	152	71	94	71	94
Road transport	175	175	275	272	244	244	137	141	165	173
Total imports	614	630	720	723	695	688	564	578	555	590
Exports										
Ship based charges	51	59	38	44	49	43	83	74	60	63
Cargo based charges	68	68	50	50	55	55	71	68	64	64
Stevedoring	195	195	195	195	195	195	195	195	195	195
Customs brokers' fees	97	97	89	89	91	94	71	71	71	71
Road transport	175	175	275	272	244	244	137	141	165	173
Total exports	586	594	647	650	634	631	556	548	555	567

Note *Based on parameters described in table 1*

Source *BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers, surveys of customs brokers and road transport operators. Stevedoring charges are for July to December 1993 obtained from PSA (1994).*

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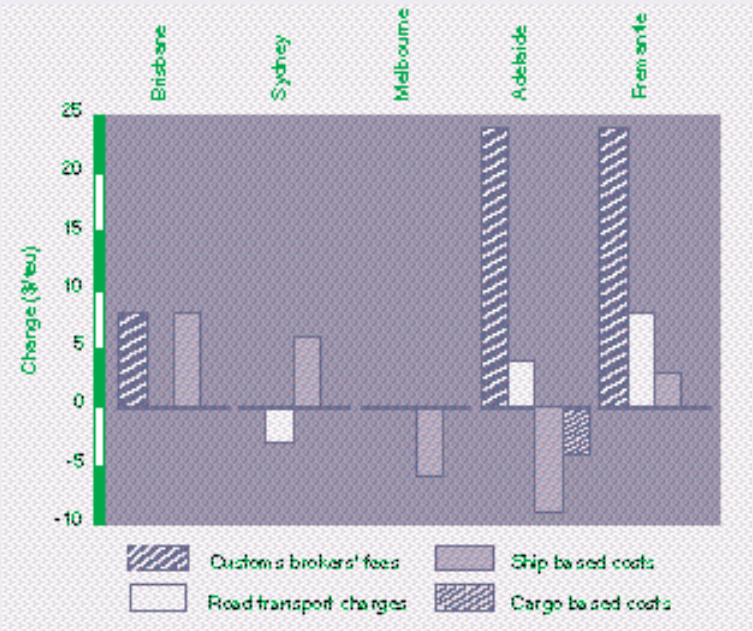
first half of 1993. The net result is that during the second half of 1993 stevedores were making profits on their container operations after making losses for much of the previous three years (PSA 1994).

The PSA (1994, p.4) noted that further gains in stevedoring productivity may be constrained by the ageing of the capital stock. Much of the container handling equipment dates from the 1970s and some of the equipment is second-hand or refurbished equipment from overseas terminals. The principal stevedoring companies have plans for modernising their equipment. The PSA notes that margins will need to be maintained if these plans are to be implemented.

FIGURE 1 SOURCES OF CHANGES IN THE IMPORT INDEX BETWEEN JULY TO DECEMBER 1993 AND JANUARY TO JUNE 1994



Source *BTCE estimates based on price schedules of port authorities, towage operators and pilotage service providers, survey of customs brokers and road transport operators, and PSA (1994).*

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Land Based Charges

The most significant change in land based charges occurred in customs brokers' fees for import clearances in Adelaide and Fremantle, where the charges increased from $71 per teu in the second half of 1993 to $94 for the first half of 1994. There was a small increase of $3 per teu for export clearances in Melbourne.

The magnitude of the change in custom brokers' fees in Adelaide and Fremantle indicates some volatility in the market as brokers adjust to the new system of optional port of lodgement. The sample size for estimating brokers' fees in

Adelaide and Fremantle is small and this undoubtedly affects the accuracy of these estimates. The Bureau is currently endeavouring to increase the sample size.

Road transport charges increased by $8 per teu in Fremantle and $4 in Adelaide and decreased by $3 per teu in Sydney.

Movements in the Index

Table 3 provides details of the index for each of the ports. At Melbourne, shore based shipping costs decreased by $3 for exports and $7 for imports. Costs for Adelaide exports decreased by $8. Other ports experienced net increases.

Figure 1 illustrates the source of changes in the import index for each of the ports. The most significant changes in shore based shipping costs adversely affect cargo owners in Fremantle and Adelaide. Nevertheless, Fremantle and Adelaide retained their positions as the ports with the lowest shore-based shipping costs and Sydney and Melbourne retained their positions as the ports with the highest total costs.

Higher road transport costs in Sydney and Melbourne are a major factor in the larger shore based shipping costs in these ports. Longer routes between the warehouse and wharf, and greater incidence of traffic congestion in the larger cities, are contributing factors to the higher road transport charges.

Table 4 illustrates movements in the national index since the second half of 1992.

The National Index

By the first half of 1994 the national figure had decreased by 1.7 per cent for imports and increased by 1.5 per cent for exports in current prices compared with 1992. When deflated by the gross non-farm product implicit price deflator the import index shows a decrease of 3.8 per cent while the export index shows a marginal decrease of 0.3 per cent in real terms. In real terms the national index in the first half of 1994 was almost unchanged compared with the second half of 1993.

PORT AUTHORITY PERFORMANCE INDICATORS

Total cargo throughput of the five ports increased by almost 7 per cent in the first half of 1994 compared with the second half of 1993. The increase can be attributed to increases in bulk cargoes. There was a decrease in non-containerised general cargo (down by 131 000 tonnes or 6 per cent) and a small reduction in containers handled by the five ports (down by 6300 teus or 0.7 per cent).

Sydney and Melbourne both recorded decreases in teus exchanged, with the other ports experiencing increases. The decreases in Sydney and Melbourne may reflect the industrial disputes during the February–March period. It is known that some ships avoided these ports during the disputes, preferring instead to discharge cargoes elsewhere and use land transport to deliver containers to the destination port.

Despite the decrease in container throughput compared with the second half of 1993, the annual total was at a record level of 1.85 million teus. Melbourne held its position as Australia's major container port, exchanging over 800 000 teus.

Port authority employment decreased further as reform of the authorities continued. Employment in the five port authorities fell by 281 (15 per cent) compared with the second half of 1993. Sydney had the largest decrease (almost 28 per cent). Not all of the decrease can be attributed to increased productivity of port authority staff, as much of the labour shedding is achieved by contracting out

TABLE 4 THE NATIONAL PORT INTERFACE COST INDEX

($/teu)

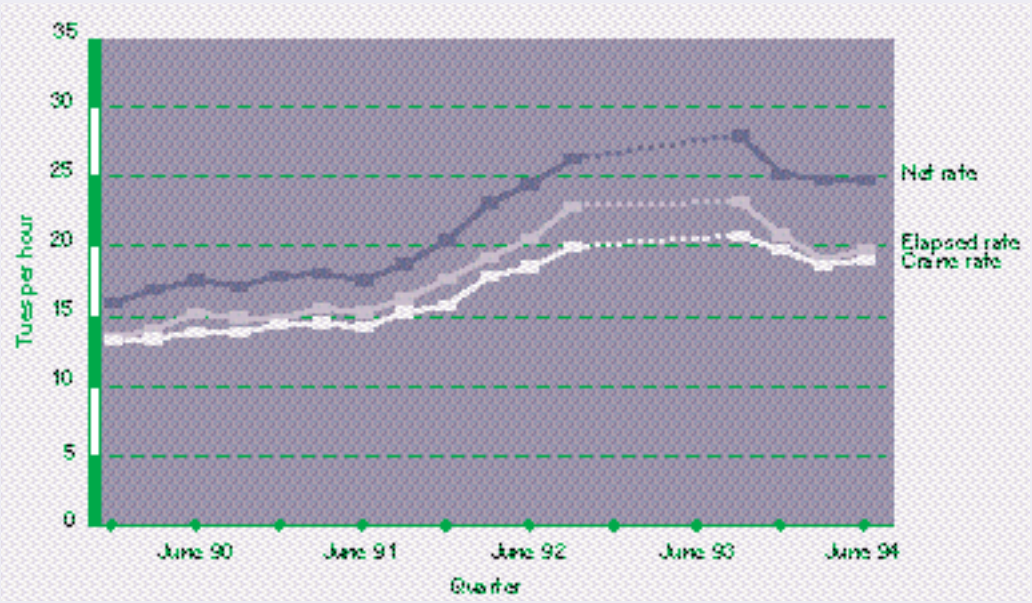
	2nd half 1992	1st half 1993	2nd half 1993[1]	1st half 1994	Change[2] (%)
Imports	691	677	677	679	–1.7
Exports	613	610	620	622	+1.5

1 Revised
2 Percentage change since second half of 1992

Note Stevedoring charges for January to June 1994 based on July to December 1993 (see PSA 1994).

Source BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers, surveys of customs brokers and road transport operators, PSA (1994). BTCE

FIGURE 2 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores, Conaust and SeaLand.*

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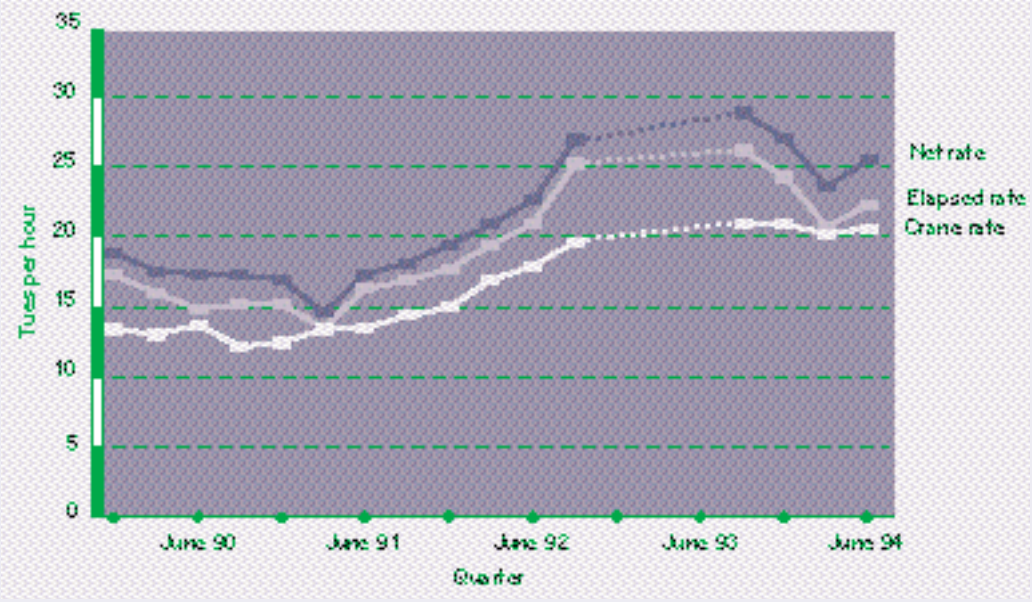
FIGURE 3 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust.*

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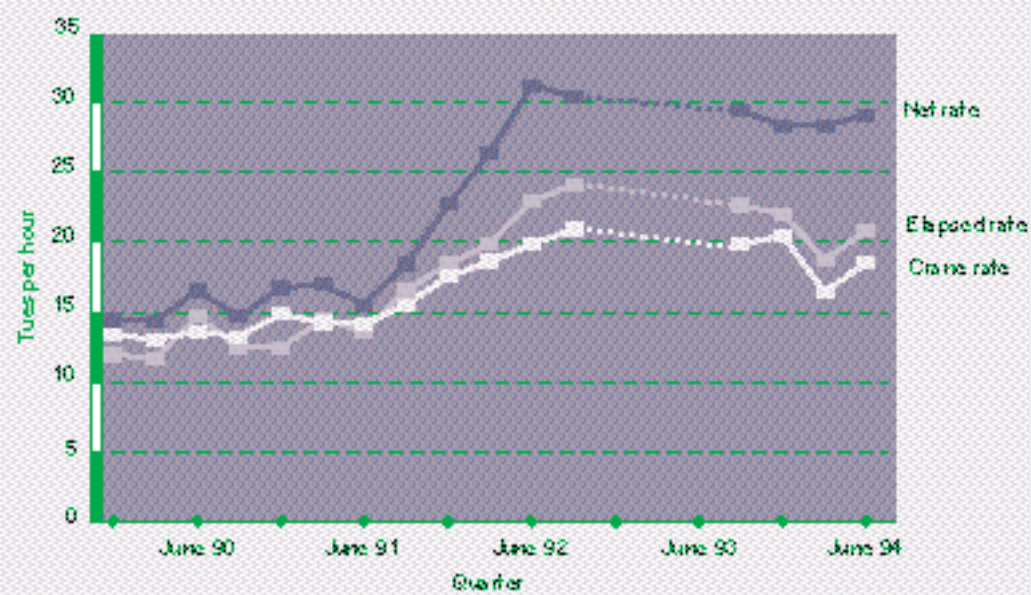
FIGURE 4 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust*

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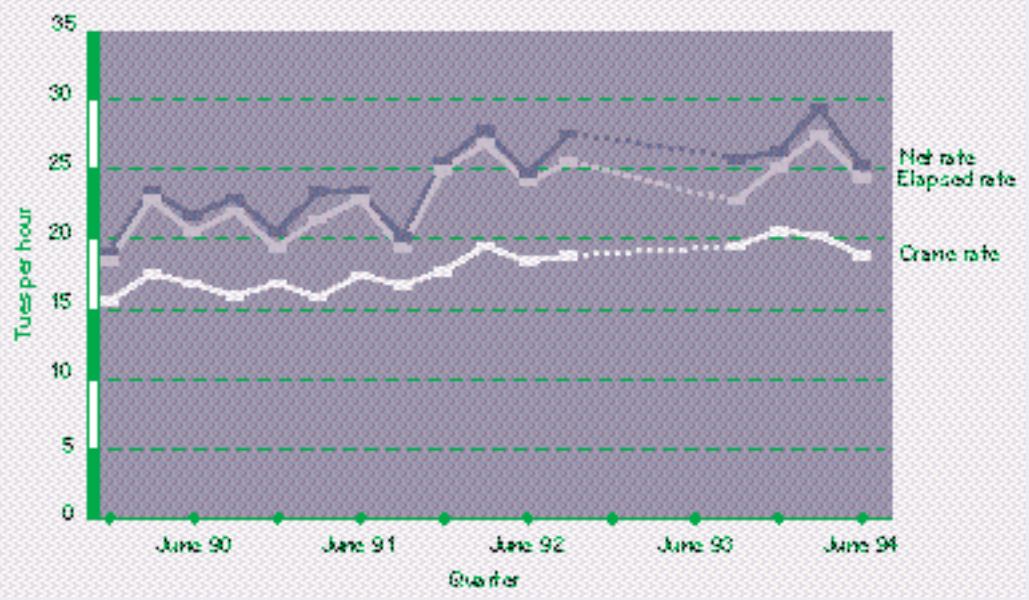
FIGURE 5 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust.*

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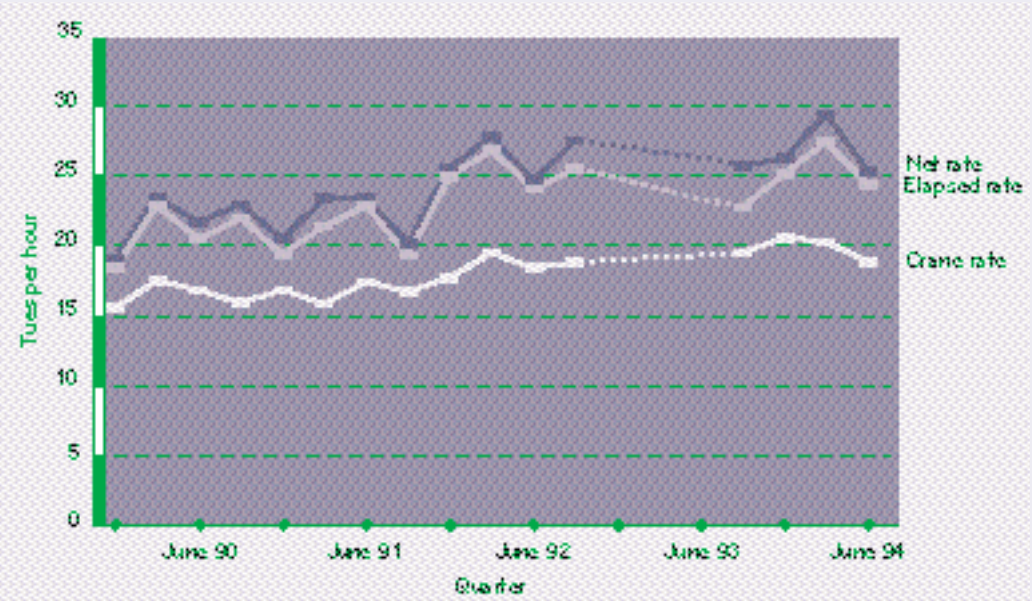
FIGURE 6 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, and SeaLand.*

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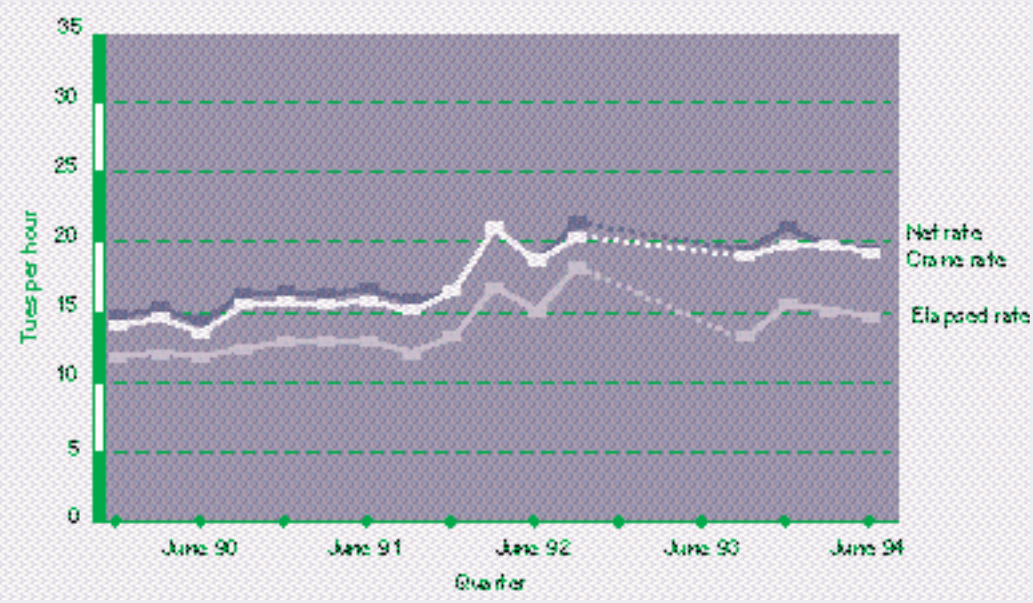
FIGURE 7 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *For the period December 1989 to September 1992 net rate is equivalent to the WIRA definition of gross rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Australian Stevedores and Conaust.*

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work previously done internally. Overall, contracting out of work that can be better done by others will lead to increased efficiency and lower costs for port users. Focusing more intently on the core activities of the authority should also assist ports to become more customer focused, a need expressed strongly by shipping lines at the 34th Biennial Conference of the AAPMA.

Median turnaround times decreased in four of the five ports. At Melbourne the median turnaround times increased by 6 per cent. Reliability of port performance is also important to ship operators and cargo owners. In table 5, reliability is indicated by the turnaround time equalled or bettered by 95 per cent of ships using the port (the 95th percentile of turnaround times). The closer the 95th percentile is to the median the less variation there is in turnaround times and the more reliable is the port. The data suggests that there may have been some improvement in three of the five ports using this measure. However, it is difficult to be certain as variations in cargo exchange volumes will also affect the 95th percentile measure. A longer time frame will be required before trends become evident.

STEVEDORING PERFORMANCE INDICATORS

In *Waterline*, the stevedoring statistic of most relevance to ship owners is the elapsed rate. The elapsed rate is determined by three factors:

- the crane rate (rate at which a single crane exchanges containers);
- the crane intensity (the number of cranes working on a ship simultaneously); and
- interruptions to ship working either through award breaks or unpredictable breaks (such as those due to industrial disputes). The shorter the interruptions the closer the net rate approaches the elapsed rate.

The divergence between net and elapsed rates was most apparent in Sydney. Elapsed rates in Sydney dropped from 78 per cent of the net rate in the December quarter of 1993 to only 66 per cent in the March quarter of 1994. That is, 33 per cent of the elapsed time was taken up with breaks during which the ship was not worked. The ratio of elapsed to net time recovered partially to 71 per cent during the June quarter (see figure 4).

Crane rates also decreased significantly during the March quarter in Sydney dropping to 16.4 from 20.4 teus per hour in the December 1993 quarter. They had recovered to 18.5 teus per hour in the June quarter (see figure 4). However, Sydney net rates were not affected to the same extent as crane intensity increased to compensate for the poor crane rates.

The Sydney performance was severely disrupted by the

TABLE 5 NON-FINANCIAL PERFORMANCE INDICATORS, MAJOR AUSTRALIAN PORTS, JANUARY TO JUNE 1994

Indicator	Unit	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Five ports
Turnaround time							
Median	hrs	27.6	40.0	47.3	24.5	27.0	–
95th percentile	hrs	48.71	86.3	115.2	71.5	72.0	–
Port authority employees	average total	233	319	442	352	271	1 617
Mean delay due to industrial stoppages	hrs per ship visit	na	na	1.1	0.0	na	–
Total port throughput	'000 tonnes	9 179	9 331	7 113	2 957	10 643	39 223
General cargo throughput[1]	tonnes	270 378	495 609	893 696	162 663	278 147	2 100 493
Teus exchanged							
Full imports	teu	34 712	144 263	171 110	9 312	36 317	395 714
Empty imports	teu	21 936	8 961	28 447	6 746	11 086	77 176
Full exports	teu	52 636	94 796	165 350	17 444	37 158	367 384
Empty exports	teu	5 665	37 017	33 964	1 039	4 692	82 377
Total	teu	114 949	285 037	398 871	34 541	89 253	922 651

na Not available
– Not applicable
1 Non containerised, excluding bulk

Source AAPMA.

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February–March industrial dispute. Negotiations for a new enterprise agreement at CTAL were also reported to have had an adverse effect on performance.

The dispute also appeared to have affected Brisbane performance (see figure 3). Although crane rates remained at close to the high levels achieved during 1993, crane intensity decreased with adverse impacts on both net and elapsed rates.

Melbourne performance is noticeably below that achieved in the September quarter 1993. Redevelopment of West Swanson Dock continued to have a negative effect on performance. Completion of the redevelopment and the arrival of a new crane are expected to lead to increased performance in 1995.

Stevedoring performance reached a peak during the September quarter 1993 as measured by the five port averages. Since then performance has stabilised at a lower level similar to that experienced during the middle of 1992. Ship operators expressed reservations about stevedoring performance during the 34th Biennial AAPMA conference held in Brisbane during October. Some users were of the view that stevedoring performance was showing signs of returning to the pre-WIRA days.

However, the statistics presented in this issue of *Waterline* do not support that view as performance during the first half of 1994, despite the severe disruptions caused by the industrial dispute, was still much better than that commonly experienced as recently as mid-1991. Nevertheless, the maintenance of performance below levels previously experienced suggests that significant improvements can be achieved.

During the first half of 1994 the elapsed rate for the five ports was below that achieved during the second half of 1993 (an average of 19.6 compared with 22.2 teus per elapsed hour). The major reason for the decrease in elapsed rate was a reduction in crane rates which for the five port average decreased from 20.4 in the second half of 1993 to 19.0 teus per hour, in the first half of 1994 (see figure 2). Net rates have remained reasonably stable over three quarters at about 25 teus per net hour indicating some divergence between net and elapsed rates.

STEVEDORING PERFORMANCE INDICATOR DEFINITIONS

Elapsed time – the total time the ship is alongside the berth offering for work whether worked or not, measured from labour ordered to last labour ashore.

Elapsed rate – the number of teus moved per elapsed hour.

Net time – the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at ship owner's request.

Net rate – the number of teus moved per net hour.

Crane rate – the number of teus moved per crane net hour.

Abbreviations

AAPMA	Association of Australian Ports and Marine Authorities
AGPS	Australian Government Publishing Service
BTCE	Bureau of Transport and Communications Economics
CTAL	Container Terminals Australia Limited
EA	Enterprise agreement
FPA	Fremantle Port Authority
GRT	Gross registered tonnage
LOA	Length overall
MSB	Maritime Services Board of New South Wales
NRT	Net registered tonnage
PMA	Port of Melbourne Authority
PSA	Prices Surveillance Authority
SA DM&H	South Australian Department of Marine and Harbors
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

Reference

PSA 1994, *Monitoring of Stevedoring Costs and Charges; Number 4*, Monitoring Report No. 21, PSA, Melbourne.

TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, MAJOR AUSTRALIAN PORTS, DECEMBER QUARTER 1989 TO JUNE QUARTER 1994

Port	Dec 89	Mar 90	Jun 90	Sep 90	Dec 90	Mar 91	Jun 91	Sep 91	Dec 91	Mar 92	Jun 92	Sep 92	Dec 92	Mar 93	Jun 93	Sep 93	Dec 93	Mar 94	Jun 94
Brisbane																			
Ships handled	51	60	63	70	88	75	89	91	91	85	96	93	na	na	na	106	111	112	140
Total teus	25 797	26 235	24 544	27 628	32 705	23 203	33 845	38 074	36 021	28 235	39 058	45055	na	na	na	49 622	46 529	37 820	52 983
Crane rate	13.3	12.9	13.6	12.0	12.3	13.3	13.4	14.3	14.9	17.0	18.0	19.8	na	na	na	21.2	21.1	20.4	20.8
Elapsed rate	17.3	16.0	14.8	15.1	15.1	13.4	16.3	16.9	17.8	19.6	21.2	25.6	na	na	na	26.6	24.6	20.9	22.6
Net rate	19.0	17.6	17.4	17.3	17.0	14.5	17.4	18.2	19.6	21.1	22.9	27.4	na	na	na	29.4	27.5	23.9	25.9
Sydney																			
Ships handled	93	110	107	108	119	107	114	109	109	105	109	112	na	na	na	205	238	177	240
Total teus	69 290	62 793	61 153	60 257	69 975	55 012	58 075	67 601	72 250	71 702	68 359	81287	na	na	na	124 028	139 321	116 914	129 586
Crane rate	13.3	13.0	13.5	13.2	14.8	14.2	14.1	15.5	17.5	18.6	19.8	20.9	na	na	na	19.8	20.4	16.4	18.5
Elapsed rate	11.9	11.6	14.6	12.4	12.4	14.4	13.6	16.5	18.4	19.9	22.9	24.1	na	na	na	22.6	22.0	18.7	20.8
Net rate	14.4	14.3	16.5	14.6	16.7	16.9	15.5	18.4	22.7	26.3	31.2	30.4	na	na	na	29.4	28.3	28.3	29.1
Melbourne																			
Ships handled	106	117	118	132	143	131	117	113	125	108	121	121	na	na	na	235	306	301	265
Total teus	82 612	71 825	70 253	84 043	81 978	72 632	73 921	75 427	95 019	73 441	82 757	86486	na	na	na	129 687	143 350	153 420	158 849
Crane rate	12.4	13.6	14.4	14.6	14.7	15.0	14.1	15.7	14.8	16.7	18.1	19.4	na	na	na	22.3	19.0	19.7	19.1
Elapsed rate	14.1	16.9	17.1	18.0	18.0	18.2	17.0	17.6	18.7	19.2	20.9	22.6	na	na	na	25.9	20.0	19.5	19.2
Net rate	17.2	20.0	20.0	19.9	20.0	20.9	19.8	20.9	20.5	22.1	23.9	24.9	na	na	na	29.3	22.9	23.8	22.7
Adelaide																			
Ships handled	23	23	(24)	(18)	29	25	19	20	21	22	20	21	na	na	na	21	26	28	34
Total teus	9 295	9 461	(9 389)	(7 516)	10 971	11 572	9 402	9 442	10 998	10 810	10 710	10763	na	na	na	9 650	12 616	13 243	12 461
Crane rate	15.8	17.8	(17.1)	(16.2)	17.1	16.1	17.7	17.0	18.0	19.8	18.7	19.1	na	na	na	19.8	20.9	20.6	19.1
Elapsed rate	18.7	23.2	(20.8)	(22.3)	19.7	21.7	23.2	19.6	25.3	27.2	24.4	25.9	na	na	na	23.1	25.5	27.8	24.7
Net rate	19.3	23.8	(22.0)	(23.3)	20.8	23.7	23.7	20.5	25.9	28.2	25.0	27.9	na	na	na	26.1	26.6	29.8	25.7
Fremantle																			
Ships handled	69	64	66	72	66	68	74	76	77	71	75	72	na	na	na	116	115	127	135
Total teus	24 380	22 362	19 411	22 339	21 567	21 205r	23 696r	22 713	26 522	25 403	26 572	27690	na	na	na	37 566	40 910	40 587	40 986
Crane rate	14.0	14.5	13.5	15.5	15.6	15.5r	15.8r	15.0	16.4	21.0	18.6	20.4	na	na	na	19.0	19.8	19.8	19.3
Elapsed rate	11.8	12.1	11.8	12.4	12.8	12.9r	12.9r	12.1	13.1	16.8	15.1	18.2	na	na	na	13.1	15.5	15.2	14.6
Net rate	14.7	15.2	14.2	16.3	16.4	16.3r	16.6r	15.8	16.4	21.0	18.6	21.4	na	na	na	19.4	21.0	19.8	19.5
Five ports																			
Ships handled	342	374	378	400	445	406	413	409	423	391	421	419	na	na	na	683	796	745	814
Total teus	211 374	192 676	184 750	201 783	217 196	183 624	198 939	213 257	240 810	209 591	227 456	251281	na	na	na	350 553	382 726	361 984	394 865
Crane rate	13.4	13.5	14.0	13.9	14.5	14.6	14.3	15.4	15.9	18.0	18.7	20.1	na	na	na	20.9	19.9	18.8	19.2
Elapsed rate	13.5	14.2	15.3	15.0	14.9	15.7	15.4	16.4	17.8	19.4	20.7	23.1	na	na	na	23.4	21.0	19.2	19.9
Net rate	16.1	17.0	17.7	17.3	18.0	18.2	17.7	18.9	20.6	23.3	24.7	26.5	na	na	na	28.2	25.4	25.0	25.0

na not available
() approximate, calculated from the five port average
r revised

Note For the period December 1989 to September 1992 the net rate is the equivalent to the WIRA definition of gross rate. See text for explanation.

Source WIRA, Australian Stevedores, SeaLand and Conaust terminal operators.

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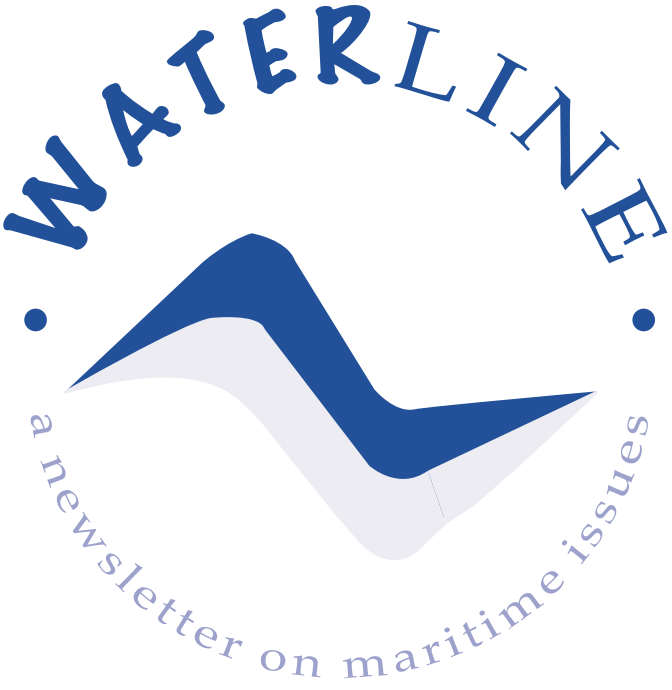

ACKNOWLEDGMENTS

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AUSTRALIA

WATERLINE

OCTOBER 1995 ISSUE NO. 4

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

The first issue of *Waterline* was released in July 1994. The response since then has been particularly encouraging and there is little doubt that the publication has been a success. However, the success of *Waterline* has created new demands.

Waterfront industry participants and policy analysts have come to rely heavily on *Waterline* as a reliable primary source of data and analyses. Consequently, there have been greater demands for the more timely publication of the data. As a response, I am pleased to introduce the first quarterly edition of *Waterline*.

Of greatest demand in *Waterline* is the partial stevedoring performance data. As of this issue these data will be published quarterly. The Bureau's Port Interface Cost Index and port authority performance data will be reported in alternate issues.

The Bureau realises that there is a continuing need to improve the type of performance data reported in *Waterline*. There is also a demand for reports on some of the more successful waterfront sectors, such as Australia's bulk cargo handling facilities. Consequently, performance and activity data for the bulk and general cargo sectors will be developed. In addition, the Bureau will pursue the possibility of regularly reporting international benchmarks of waterfront performance.

Dr Maurice Haddad

Director

IN BRIEF

Stevedoring performance

The March quarter five port average crane rate was the highest since September 1993. Crane rates in all of the five ports declined in the June quarter.

Brisbane crane rates continue to decline. Brisbane was the worst performing port for both the March and June quarters.

At Sydney, crane rates for the first half of 1995 were significantly better than for the previous six months. However, the 18.1 teus per hour June crane rate was the second lowest performance of the five ports.

Despite a decline in performance at Melbourne in the June quarter, the results suggest that the capital investment at both East and West Swanson docks is beginning to have a positive impact on performance.

For the past 12 months Adelaide has been the most consistent performing port, with elapsed handling rates above those of other ports.

Fremantle's performance was affected by industrial disputes. Crane rates fell from record rates to 19.3 teus per hour in the June quarter. Nevertheless, Fremantle's average crane rate of 21.0 teus per hour for 1994/95 was the highest of all five ports.

The five port average stevedoring time to exchange 560 teus has declined from over 40 hours prior to the WIRA program, to between 25 and 30 hours in recent quarters.

International Benchmarking

On September 1, the Bureau of Industry Economics (BIE) released its second waterfront benchmarking study — *Waterfront 1995*. This issue of *Waterline* foreshadows the regular publication of the BTCE's work on monitoring international waterfront benchmarks.

Comparing Port Costs

This edition of *Waterline* shows that, from the shipper's point of view, comparisons of port costs using a uniform teu exchange per port call are inappropriate. Port call data supplied by the AAPMA for 1994 indicate that there is significant variation between ports in terms of the frequency and size of ships calling at each port, and more importantly, the volume of containers exchanged at each port call.

STEVEDORING PERFORMANCE

Two important considerations should be taken into account when using the stevedoring performance data reported in *Waterline*. Firstly, the data represent partial indicators of stevedoring performance, concentrating on productivity rather than reliability. Although recent criticisms of waterfront performance have been aimed at the reliability of stevedoring performance, there is a lack of industry wide data to allow adequate monitoring of this issue. Importantly, some industry commentators have stated that reliability rather than productivity is the more important issue. Certainly for high value cargoes, particularly manufactured goods, this would appear to be the case.

Unreliability on the waterfront can impose significant costs on ship operators and cargo owners. Although the direct costs can be large, the indirect costs are often much larger. Prior to the WIRA program, the BTCE (1990) estimated that the costs of waterfront unreliability were between $850 million and $1000 million in 1988. The more significant of these costs were associated with inventory costs and lost market opportunities for exporters. Speakers at the recent Australian Institute of Marine Law seminar commented that the inability to maintain fixed day schedules at Australian ports was the direct result of variable and often unpredictable performance.

Secondly, disputes by other port service providers contribute to ship delays that may not be reflected in stevedoring performance data. Although stevedoring performance is a major element of port performance, stevedoring performance data should only be used as a proxy for total port performance with caution. This is principally because of the inability of stevedoring performance data to fully measure the impact of industrial disputes within the terminal and throughout the port interface.

Although the average performance of the five ports improved during the first half of 1995, the average masks variations in performance between ports and terminals, and does not indicate the reliability of the ports.

The perception of a deterioration in waterfront performance is partly the result of the number of industrial disputes that occurred in the last year. However, the recent BTCE report on the waterfront industry reform program (BTCE 1995) commented that the restructuring of waterfront labour arrangements has lessened the impact of disputes. As a result of company rather than industry employment arrangements most disputes disrupt only one company or at most one port, thus allowing options for reducing delays to ships. The report found that the rationalisation of waterfront unions has meant that industrial disputes have tended to be more concentrated rather than the rolling disputes involving several unions in sequence that disrupted the industry before WIRA. However, due to data limitations, the volume of cargo delayed, and for how long that cargo was delayed, can not be compared between the pre and post-WIRA periods.

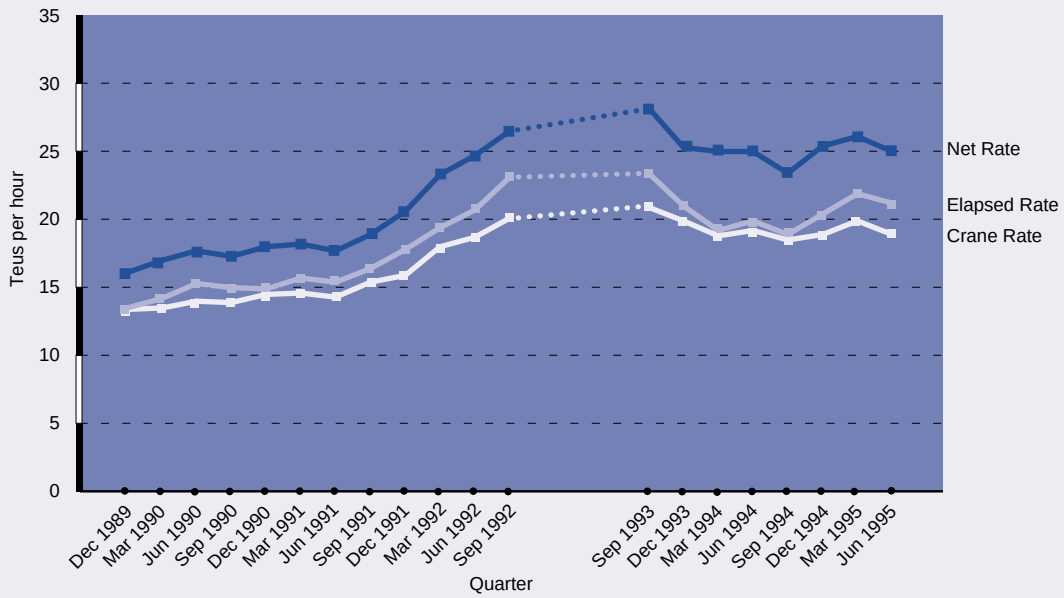
The five port average container stevedoring performance increased for the March quarter. The five port crane rate increased to 19.9 teus per hour, the highest since the September quarter in 1993 (figure 1). Unfortunately crane rates in all of the five ports declined in the June quarter, with the result that the five port average declined to 18.9 teus per hour. Net and elapsed rates generally followed the trends in crane rates. Industrial disputes significantly affected performance in Fremantle during the June quarter. However, the decline in performance in the other ports cannot be attributed to any single cause. Uncertainty engendered by union elections and negotiations of new enterprise agreements are thought to have been contributing factors.

Nevertheless the five port average crane rate of 19.6 teus per hour for the first half of 1995 was a significant improvement on the 18.7 teus per hour recorded for the second half of 1994.

The decline in performance reported for Brisbane in *Waterline 3* continued in the first half of 1995 (figure 2). Brisbane reported the lowest crane rates of the five ports for both the March quarter (18.4 teus per hour) and the June quarter (18.0 teus per hour). Both net and elapsed rates for Brisbane declined in the March quarter. Although both rates recovered partially in the June quarter, performance is still below the levels reported for the September and December quarters in 1994. The increase in net rates in the June quarter in the face of declining crane rates indicates that the crane intensity increased at Brisbane during the quarter.

The improvement in crane rates in Sydney is a promising sign. The rates of 18.9 in the March quarter and 18.1 in the June quarter are a significant improvement on the 16 teus per hour reported for the December 1994 quarter. The graph of crane rates in figure 3 indicates that although the downward trend in Sydney appears to have halted, it is not clear that a reversal of the trend has

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS



Note *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick, Conaust and SeaLand.*

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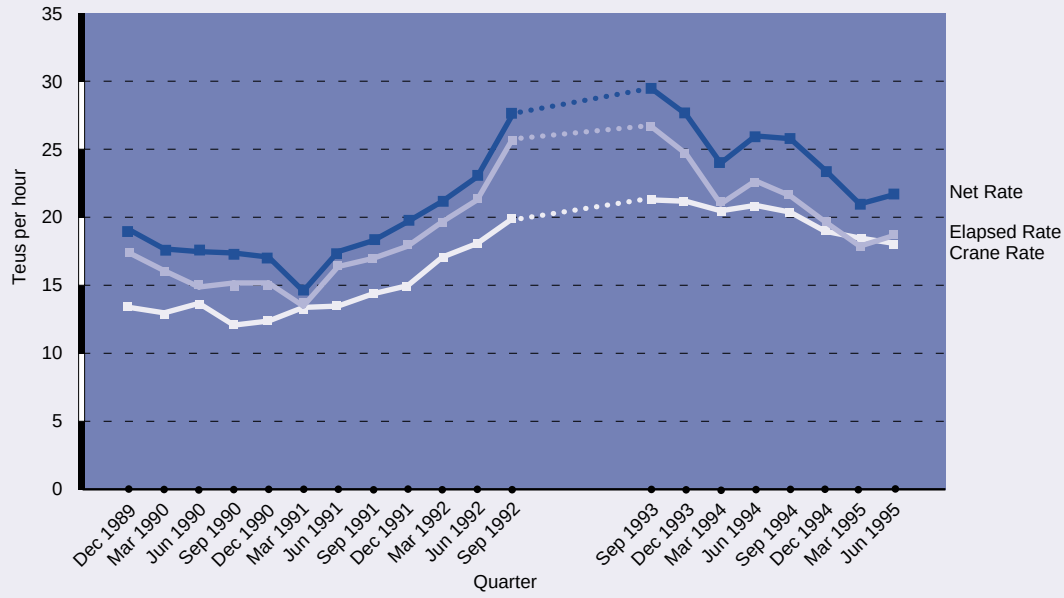
FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick and Conaust.*

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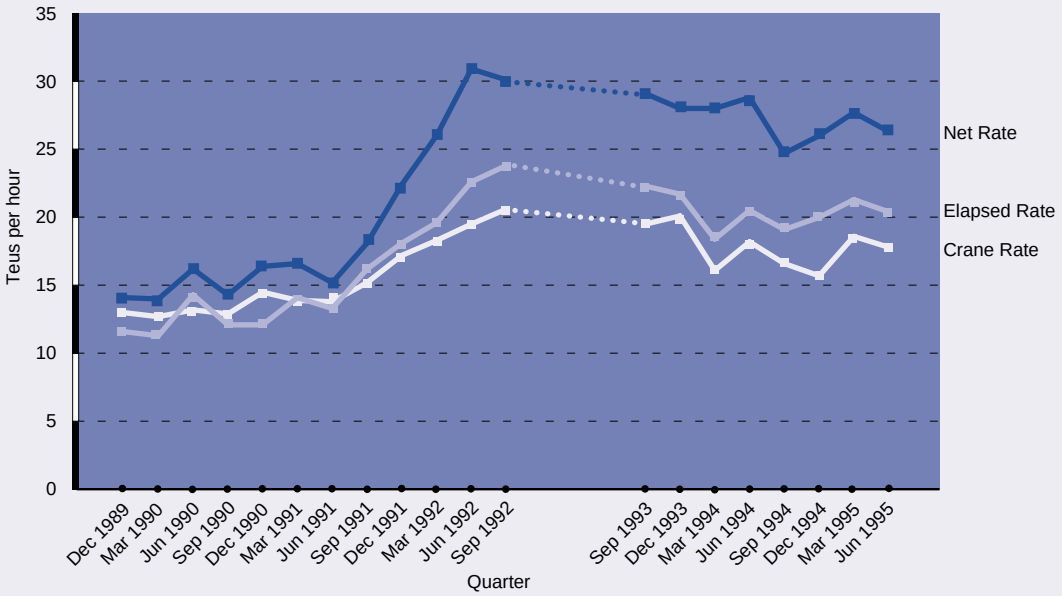
FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick and Conaust.*

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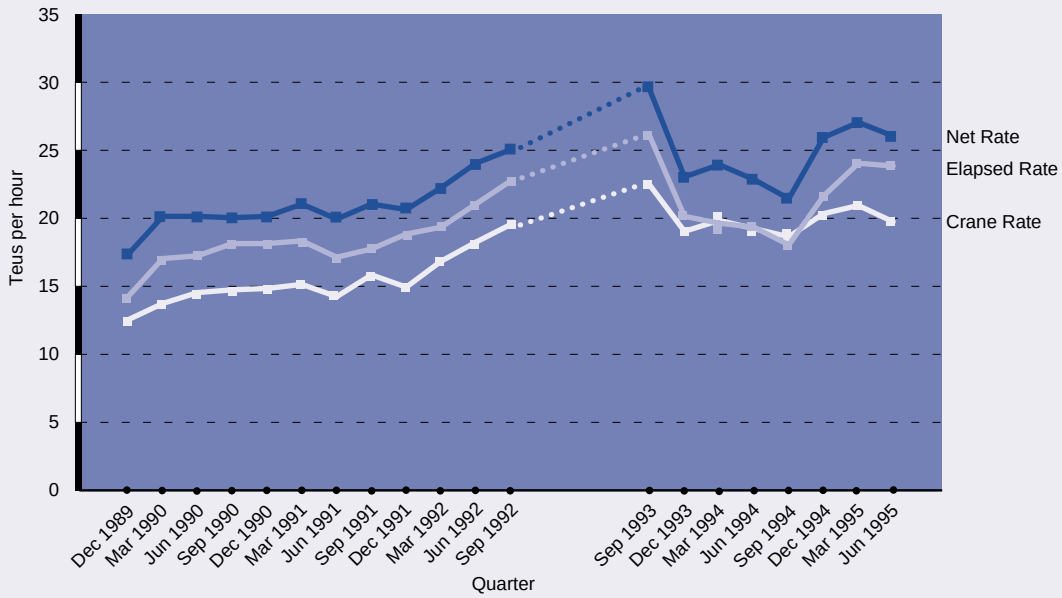
FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick and Conaust.*

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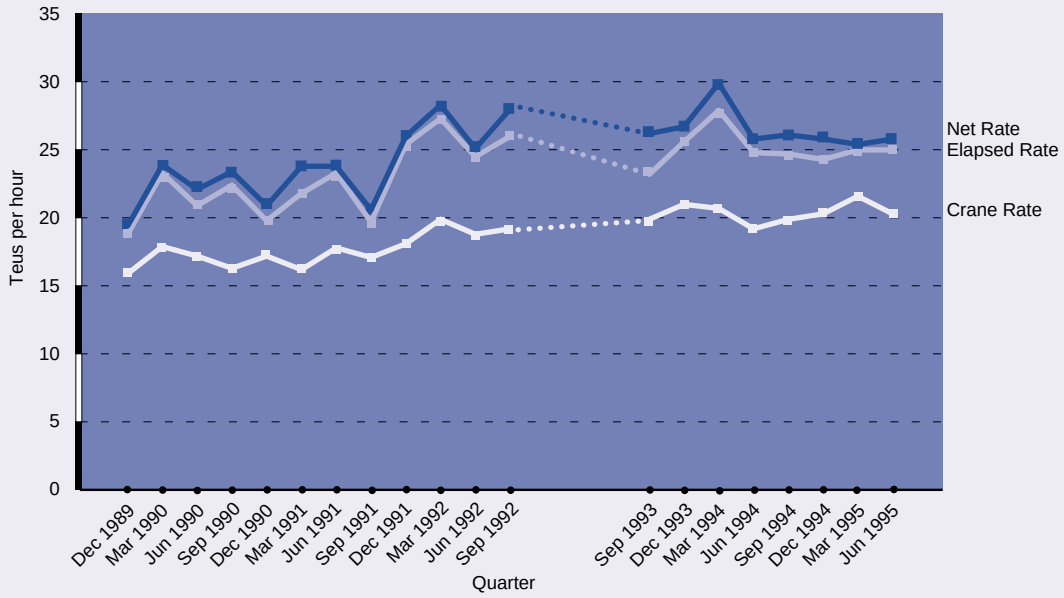
FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS



Note *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA and SeaLand.*

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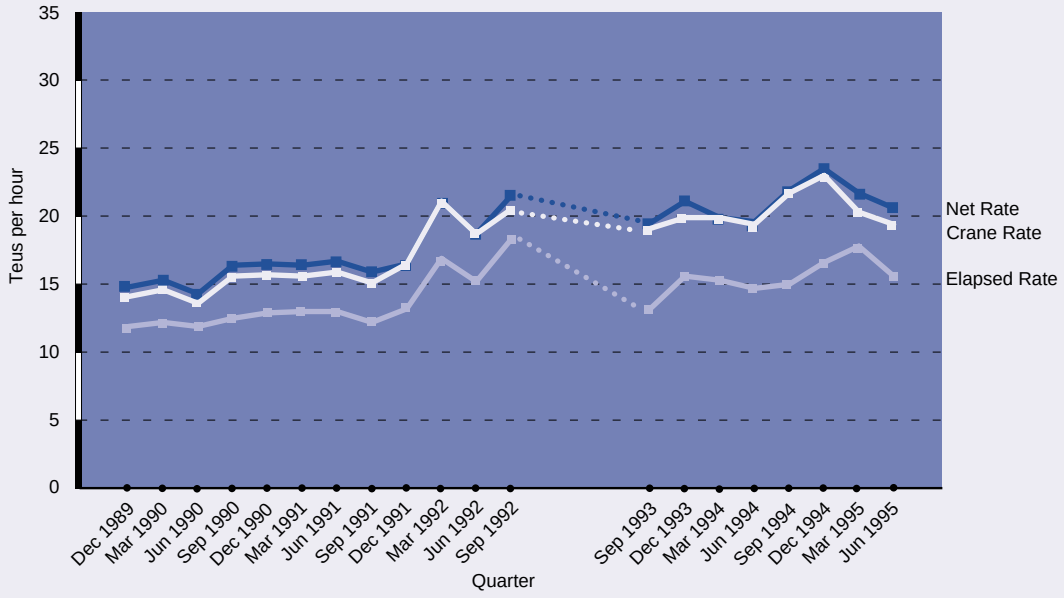
FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Note *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick and Conaust.*

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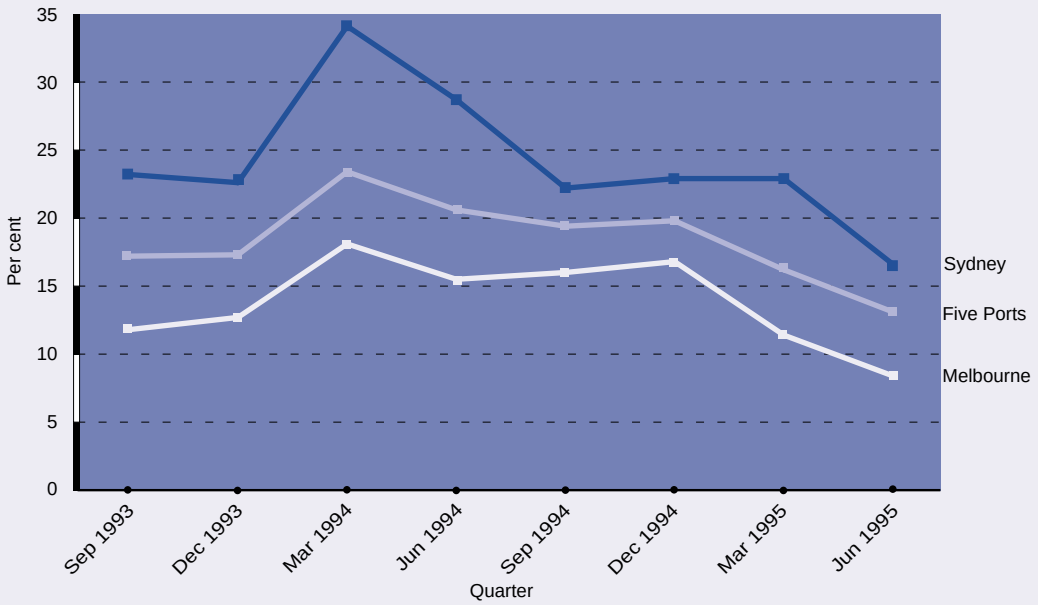
FIGURE 7 PROPORTION OF ELAPSED TIME NOT WORKED, MAJOR PORTS



Source WIRA, Patrick, Conaust and SeaLand.

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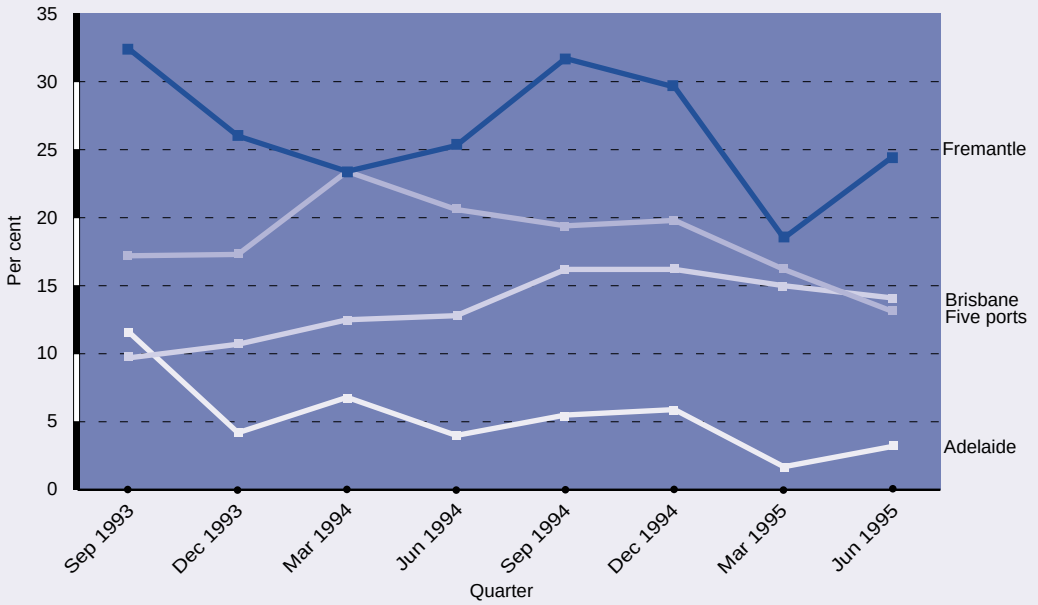
FIGURE 8 PROPORTION OF ELAPSED TIME NOT WORKED, MINOR PORTS



Source WIRA, Patrick, Conaust and SeaLand.

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occurred. However, industry expectations of improved productivity have increased with the new Productivity Employment Proposal (PEP) being negotiated between Conaust and the MUA.

Container stevedoring performance at Fremantle has been affected by industrial disputes to a greater extent than the eastern ports (figure 6). Crane rates declined from the record rate of 22.9 teus per hour in the December quarter to 19.3 teus per hour in the June quarter.

The new PEP is designed to increase crane rates to 24 containers per hour. It is expected that higher productivity will be achieved by improving productivity incentive payments, re-organising and upgrading existing methods and through the introduction of new equipment. If successful, the PEP is expected to be introduced into other Conaust terminals.

The improved crane rates reported in *Waterline 3* for Melbourne during the December quarter of 1994 appear to have been sustained during the March and June quarters of 1995 (figure 4). The disruption caused by redevelopment of the Swanson Dock terminals is lessening. The introduction of a new container crane at East Swanson Dock and straddle carriers at both East and West Swanson Docks contributed to improved productivity. Crane intensity has increased to an average value of 1.30 during the first two quarters of 1995 compared with 1.22 in the second half of 1994. Both the net and elapsed rates improved significantly.

Adelaide's performance has been consistent since the end of the WIRA program with a small upward trend apparent in reported crane rates (figure 5).

Container stevedoring performance at Fremantle has been affected by industrial disputes to a greater extent than the eastern ports (figure 6). Crane rates declined from the record rate of 22.9 teus per hour in the December quarter to 19.3 teus per hour in the June quarter. The net rate has increased relative to the crane rate due to Patrick commissioning a second container crane in October 1994. For several quarters prior to then, both stevedoring companies in Fremantle could only deploy one crane per ship (or a crane intensity of one).

Time not worked

The difference between the elapsed time and the net time (see definitions on page 14) provides a measure of the time the ship is available to be worked but lies idle. The difference as a percentage of elapsed time is plotted in figures 7 and 8.

The figures show a reduction in the average time not worked for the five ports. This suggests that, on average, less time is being lost due to poor weather, awaiting cargo, industrial disputes, closed holidays, factors associated with the ship's fault and shifts not worked at the ship operator's request. However, there is no consistent trend among the five ports.

Adelaide apparently loses very little time once labour comes on board (figure 8). The proportion of time lost has been less than 10 per cent since the December quarter in 1993. In contrast, except for March 1995, time not worked in Fremantle has exceeded 20 per cent since the September quarter 1993. This is due to occasional labour shortages in Fremantle, whereby third shifts cannot always be worked to complete container exchanges.

Stevedoring time for ships with an exchange of 560 teus

The Waterfront Industry Reform Authority used the reduction in time to stevedore ships exchanging 560 teus as a measure of the productivity improvements achieved during the time WIRA was in existence.

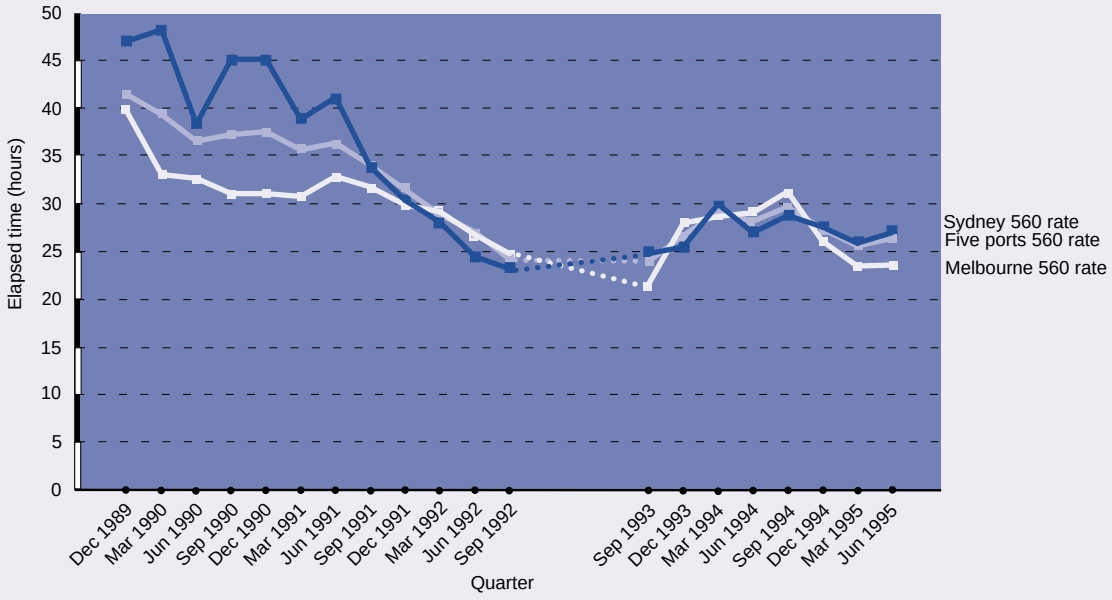
The five port average stevedoring time declined substantially during the WIRA period from in excess of 40 hours to just under 25 hours. Since then the five port average has stayed between 25 and 30 hours.

The BTCE has estimated stevedoring times for a 560 teu exchange for each quarter from December 1989 to June 1995. Stevedoring times were estimated on the basis of reported elapsed rates, that is, from the time labour is first ordered to the last labour is off the ship. These figures differ from the total port turnaround times reported in *Waterline 3* (table 6), as those figures related to the total time in port which is usually measured from port boundary to port boundary.

Figures 9 and 10 show that the five port average stevedoring time declined substantially during the WIRA period from in excess of 40 hours to just under 25 hours. The Bureau commenced monitoring from the September quarter in 1993. Since then the five port average has stayed between 25 and 30 hours.

Between the ports, there is considerable variation in the time taken to exchange 560 teus. The influence the major ports of Sydney and Melbourne have on

FIGURE 9 ELAPSED TIME FOR EXCHANGE OF 560 TEUS, MAJOR PORTS



Note *Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick, Conaust and SeaLand.*

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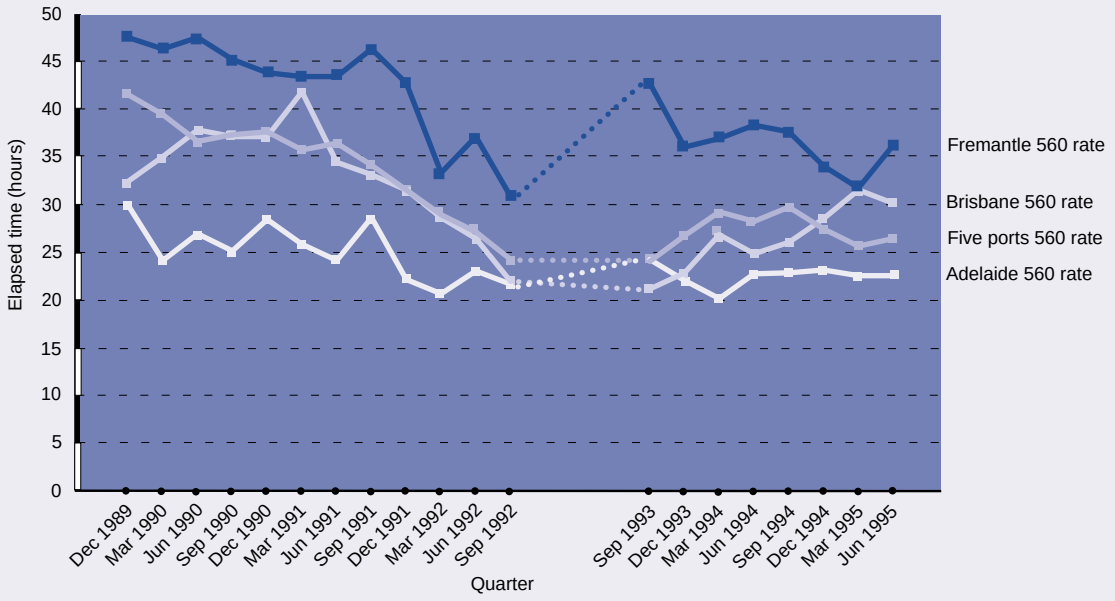
FIGURE 10 ELAPSED TIME FOR EXCHANGE OF 560 TEUS, MINOR PORTS



Note *Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick, Conaust and SeaLand.*

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the five port average is shown in figure 9. Since September 1993 Brisbane has shown an upward trend in stevedoring times and in the June 1995 quarter, Brisbane stevedoring times were just over 30 hours for the 560 teu exchange, or 50 per cent longer than in September 1993 (figure 10).

The effect of industrial disputation in Fremantle during the June quarter is clearly shown in figure 10 with stevedoring times increasing from 31.7 hours in the March quarter to 36.2 hours in the June quarter, an increase of 14 per cent. Adelaide has performed consistently since the December quarter 1993, having the fastest average stevedoring times for the 560 teu exchange.

COMPARISON OF PORT CHARGES - A METHODOLOGY

Making comparisons between Australia's major international container ports is always difficult, particularly when discussing port charges. There is the difficulty of comparing like with like, with some port services being provided by either private or public companies, while charges for port services are often called different names and are recovered by a number of different agents. The physical characteristics affect the type of services provided and the cost of those services. However, even when these problems have been sorted out, there remains a more fundamental dilemma — the appropriate ship size and container exchange, the selection of which can have a significant impact on the outcomes of the comparisons being made.

This article considers alternative port cost comparisons, using the ship based charges of tonnage, pilotage, towage and mooring, and 1994 port call data to illustrate some of the limitations in comparing port charges.

Cargo based charges have also been included in the analysis to provide a more complete picture of the costs incurred by shippers of cargo through Australia's container ports. Sydney and Adelaide cargo charges differentiate between import and export containers, and for these ports, only export container costs are reported. Export container charges are $15 and $3 less per teu than import charges in Sydney and Adelaide respectively.

The most common method of comparing port charges is from the ship operator's view, and is based on the same vessel exchanging the same volume of cargo at different ports. When there is some competition between ports such analyses are appropriate for ship operators determining the choice of port or service network given their existing fleets. Such information is also important to ship operators for determining their appropriate fleet composition for a given trade.

Table 1 illustrates the comparative port and related charges per teu for an exchange of 500 teus for container ships of various sizes. Table 2 indicates the number of tugs used to calculate towage charges. This method of port charge comparison has typically been used to support the argument that the smaller ports are much cheaper than the larger ports. Indeed, the relative difference in costs per teu between the minor and major ports is further amplified with lower teu exchanges.

The reason is that smaller ports tend to have lower ship based charges and higher cargo based charges than the larger ports. This favours the smaller ports when a small number of teus are exchanged. The smaller ports use this pricing policy as a

TABLE 1 COMPARISON OF PORT AND RELATED CHARGES FOR EXPORTS, 500 TEUS EXCHANGED

$ per loaded export teu

Ship size (GRT)	Brisbane	Sydney	Melbourne	Adelaide	Fremantle
7250	81	74	85	90	87
12250	94	86	93	96	95
17250	99	97	102	100	98
22250	104	110	117	110	105
27250	117	116	128	114	117
32250	122	122	136	117	121
37250	122	127	142	122	123
42250	126	133	149	124	136

Note Excludes state government charges.
Adelaide charges assume 25 hours for berth hire.
Towage task is shown in table 2.

Source Port Interface Cost Index, BTCE calculations.

BTCE

TABLE 2 NUMBER OF TUGS USED TO CALCULATE PORT AND RELATED CHARGES

Ship size (GRT)		Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
From	To	in	out	in	out	in	out	in	out	in	out
5001	10000	1	1	2	1	2	2	2	2	1	2
10001	15000	2	2	2	2	2	2	2	2	2	2
15001	20000	2	2	2	2	2	2	2	2	2	2
20001	25000	2	2	3	2	3	2	3	2	2	2
25001	30000	3	3	3	2	3	3	3	2	3	2
30001	35000	3	3	3	2	3	3	3	2	3	2
35001	40000	3	3	3	2	3	3	3	2	3	2
40001	45000	3	3	3	2	3	3	3	2	3	3

Note Indicative numbers only.

Source Various port harbour masters and pilots.

BTCE

marketing tool to attract additional ship calls.

Ship charges tend to increase with increased ship size and using the same teu exchange for different ship sizes does not take into account that larger ships have the capability of offsetting these higher charges by exchanging larger numbers of containers. Some analysts recognise this and conduct sensitivity tests with a range of teu exchanges. The chosen exchanges are usually arbitrarily chosen and tend to reflect proportionally larger ships, for example, exchanges of 300, 600 and 900 teus. However, since the method still uses the same teu exchange for all ports, the results reflect the trends in table 1, and only the magnitudes in the difference between ports change. As a result, the conclusion usually drawn is that the ranking of port charges is insensitive to different volumes exchanged. However, port call data from 1994 indicate that different ports tend to have differing average container exchanges for a given ship size.

The importance of shipping to a port can be expressed two ways: the frequency that a ship calls; and the volume of cargo that the ship exchanges. Table 3 indicates that for Australia's mainland capital city ports, ships between 15 000 and 20 000 GRT represent the most significant group of ships by port call. However, in terms of throughput, ships between 35 000 and 40 000 GRT are just as important to the port of Brisbane and Adelaide. To a lesser extent, larger ships are also significant in Melbourne and Sydney.

Using 1994 port call data supplied by AAPMA, the average ship size and number of teus exchanged per port call were calculated. Interestingly, table 4 indicates that the number of teus exchanged for a given ship size varies significantly. Although there is some relationship between ship size and teus exchanged, it is not strong.

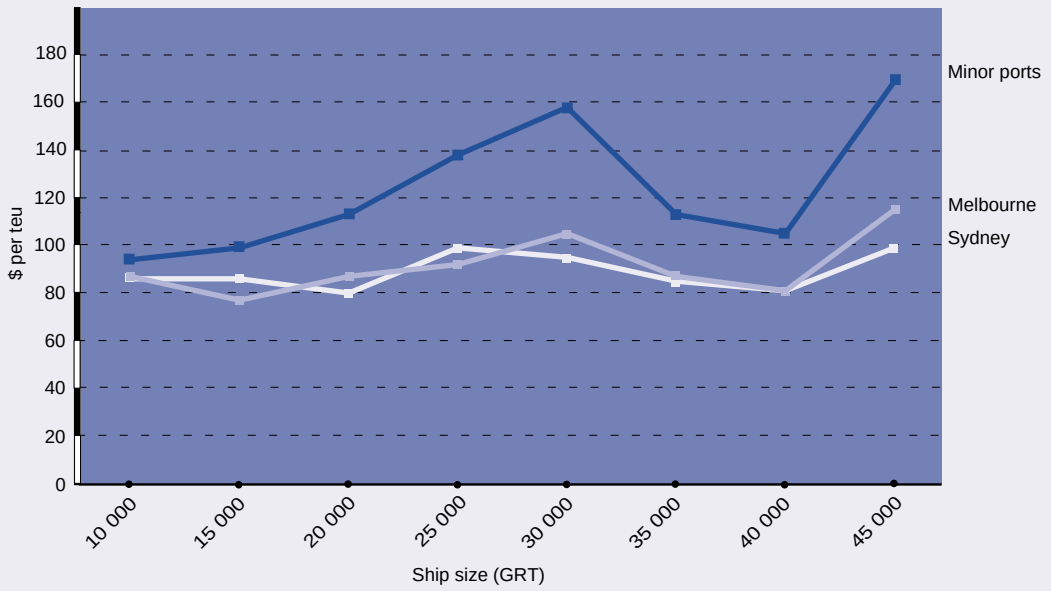
Table 5 shows the comparative port costs using the 1994 port call data provided in table 4 and the towage task provided in table 2. Figure 11 illustrates the comparative port costs between Melbourne and Sydney, and the weighted average of the smaller ports, with the number of teus exchanged used as weights. This method illustrates that far from being the most expensive, Sydney and Melbourne are comparatively less expensive on a cost per teu basis than the smaller ports for all port calls. This is because of two similar reasons.

Firstly, for all ship sizes, the increased port call costs at Sydney and Melbourne tend to be offset by larger teu exchanges in such a way that the charges per teu are fairly uniform regardless of the ship size. This contrasts with the minor ports where the lower ship charges are outweighed by the significantly smaller teu exchanges. Indeed, for a minority of port calls the charges per teu are about 75 per cent more than at the major ports. On a per teu basis, the smaller ports could achieve lower costs for shippers by increasing the number of teus exchanged per port call, principally through a reduction in the number of port calls. However, assuming that shippers prefer more port calls to less, this would represent a deterioration in service quality for shippers through these ports.

Although costs per teu are higher at the smaller ports, the alternative option of centralising cargo at a major port may result in still higher costs. Furthermore, ship operators may achieve marketing advantages and higher load factors by including calls at the smaller ports in their schedules.

Secondly, it is believed that port authorities tend to structure

FIGURE 11 INDICATIVE EXPORT PORT AND RELATED CHARGES



Note *Minor ports represent the weighted average of port and related charges for Fremantle, Adelaide and Brisbane. Port and related charges include the tonnage, pilotage, towage, mooring and cargo based charges.*

Source *Port Interface Cost Index, BTCE calculations.*

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their charges in response to the demand for port services and the segment of the shipping market they wish to attract. Therefore, to a large extent, charges will depend on the size and number of ships using the port, and the volume of cargo exchanged per port call. Because these parameters can differ significantly between ports, a comparison based on a uniform ship size and teu exchange is unlikely to represent adequately the costs experienced by typical shippers at individual ports.

Using the number of teus exchanged for each ship size as weights, the analysis was extended to estimate total average port and related charges for each port for 1994. The results confirmed that the method used for the Port Interface Cost Index produces cost per teu results that are close to the weighted average across all ships sizes.

The analysis illustrates that the method used to make port charge comparisons depends upon who the comparison is being made for. For ship operators, with a given ship or fleet, port charges should be compared with the expected teu exchange for each port. For determining the average costs incurred by shippers through a port, the representative ship size and teu exchange for the majority of port calls at that port should be used. Subsequently, when comparing port costs, these representative parameters should be determined for each port. Without port call data, as is often the case when comparing international ports, the comparisons of port costs from the cargo owner's view should be done with caution.

INTERNATIONAL BENCHMARKING

With international benchmarking, it is possible to make general industry comparisons and to use these as broad guidelines as to how far a particular national industry needs to improve its performance to meet best practice.

In recent years, the BIE has adopted the practice of benchmarking, which was developed primarily to compare performances between like companies or subsidiaries of a particular company, and has extended that technique to evaluate the performance of selected Australian service industries in an international context.

It is obviously more difficult to make valid comparisons at a highly aggregated level and to adequately account for

TABLE 3 DISTRIBUTION OF PORT CALLS OF FULLY CELLULAR CONTAINER SHIPS IN 1994, PER CENT

Ship size (GRT)		Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
From	To	Port calls[a]	Cargo[b]	Port calls	Cargo	Port calls	Cargo	Port calls	Cargo	Port calls	Cargo
1	5000	0	0	0	0	6	2	0	0	0	0
5001	10000	15	7	14	7	10	7	2	2	4	8
10001	15000	14	13	10	8	8	8	2	1	5	9
15001	20000	30	26	29	32	35	33	35	27	51	52
20001	25000	15	11	22	19	15	16	9	5	13	11
25001	30000	5	4	8	9	12	11	15	12	19	14
30001	35000	5	7	3	4	3	4	4	9	0	0
35001	40000	16	32	9	16	8	16	18	31	1	1
40001	45000	0	0	4	5	3	4	16	13	7	6
45001	50000	0	0	0	0	0	0	0	0	0	0

a. Per cent of all port calls by fully laden cellular container ships in 1994.

b. Per cent of total throughput in teus for fully cellular ships in 1994.

Source AAPMA.

BTCE

differences in geography, labour market regulation, traffic density, trade volumes, climate and a host of other factors which differentiate the environment in which industry performance is evaluated.

Waterfront 1995

In its most recent benchmarking study — *Waterfront 1995*, the BIE reported on price, timeliness and productivity indicators for 20 container ports and 10 coal ports worldwide. The BIE also presented information on break-bulk stevedoring, drawn from information provided by BHP Transport Ltd in its 1995 steel products benchmarking study.

Containers

The BIE found that total waterfront charges for a typical container ship visit are generally similar across Australian ports but relatively high by international standards However, Australian port charges were found to be less than US port charges.

More expensive port operations could be argued in terms of providing a higher level of service for the port users. Unfortunately, this does not seem to be the case for Australian container ports. The BIE report found that container handling performance in Australia still needs to improve markedly for Australia to perform on a par with overseas competitors. The BIE considered that achieving a target crane rate of 30 moves per hour, or an increase of about 70 per cent of the rate achieved in the June quarter, would see Australian ports operating on a par with the best performing overseas ports.

The relatively poor performance of Australian ports was further drawn out in a survey of ship operators reported by the BIE. Out of 18 Australian and overseas ports, Brisbane ranked 12th, Adelaide 15th, Melbourne 17th and Sydney 18th in terms of speed and reliability of waterfront services such as pilotage, towage and stevedoring.

TABLE 4 PARAMETERS USED IN THE CALCULATION OF PORT AND RELATED CHARGES

Ship size (GRT)		Brisbane		Sydney		Melbourne		Adelaide			Fremantle	
From	To	Mean ship size (GRT)	Mean exchange (teu)	Mean ship size (GRT)	Mean exchange (teu)	Mean ship size (GRT)	Mean exchange (teu)	Mean ship size (GRT)	Mean exchange (teu)	Average berth time	Mean ship size (GRT)	Mean exchange (teu)
5001	10000	8389	185	8366	369	8977	513	9949	470	38	9965	653
10001	15000	13223	354	13309	522	12968	784	11217	362	21	13314	661
15001	20000	17787	336	17035	741	17417	688	17193	319	22	7075	363
20001	25000	21301	280	22389	604	21941	770	22857	220	15	23611	277
25001	30000	27235	319	27290	711	27517	706	26677	339	25	27167	249
30001	35000	31721	495	31580	949	31580	1105	32534	929	39	31434	275
35001	40000	36834	768	36775	1144	36787	1391	36480	729	34	35700	300
40001	45000	43704	231	43456	831	43528	760	43449	323	21	43393	316

Source AAPMA port call data.

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TABLE 5 COMPARISON OF PORT AND RELATED CHARGES FOR EXPORTS, INDICATIVE PORT CALL

Ship size (GRT)		*$ per loaded export teu*					
From	To	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Minor[a] ports
5001	10000	105	86	87	97	82	94
10001	15000	106	86	77	106	88	99
15001	20000	115	80	87	121	111	113
20001	25000	131	99	92	167	139	138
25001	30000	144	95	105	138	170	158
30001	35000	122	85	87	94	167	113
35001	40000	103	81	81	105	161	105
40001	45000	193	99	115	157	178	169

a. Minor ports represents the weighted average of port and related charges for Fremantle, Adelaide and Brisbane.

Note Based on the parameters in tables 2 and 4.
Port and related charges exclude state government charges.

Source AAPMA, Port Interface Cost Index, BTCE calculations.

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Coal

Waterfront charges for coal handling at the Newcastle, Gladstone and Hay Point terminals were found to be among the lowest in the world. Australian charges are generally lower than at rival terminals in North America and South Africa. The lower terminal charges are supported by high labour productivity and capital utilisation. However, the BIE notes there is some room for further improvement. For example, while towage and pilotage represent only a small proportion of waterfront charges, they are generally more expensive in Australia than at the overseas coal ports.

Break bulk

Break bulk cargoes consist of those which are not containerised, such as steel coil, timber, newsprint and motor vehicles. The BIE used information provided by BHP Transport in their steel products benchmarking study. This revealed that in late 1994 Australia's non terminal waterfront charges for breakbulk cargoes were high by international standards, with the lowest charges in Australia equivalent to the more expensive ports on the west coast of North America.

Waterline has to date concentrated on reporting movements over time in prices and operating performance at Australian container ports. While this information summarises trends in performance at individual ports, it does not indicate whether Australian ports are moving towards the goal of achieving international best practice.

In future, Waterline will examine waterfront performance in other countries in more detail. Issue 5 of Waterline will report on waterfront charges and performance in New Zealand.

The report acknowledges, however, that a number of Australian port authorities have since made substantial reductions to their charges.

BHP Transport also compared the productivity of loading operations for a number of its steel products. Stevedoring loading costs in Australia were consistently higher than those overseas, reflecting a combination of low productivity and relatively high wages.

Review of the waterfront industry reform program, BTCE Report 91

The establishment of the Waterfront Industry Reform Authority in 1989 marked the commencement of the Government's waterfront reform program. Over the following three years the Government and the industry contributed a total of $419 million to fund the program.

Bureau of Transport and Communications Economics Report 91, *Review of the Waterfront Industry Reform Program* analyses the impact of the reform program on stevedoring performance and costs. It identifies changes to labour arrangements and job structures on the waterfront.

The BTCE estimated that substantial benefits to waterfront users of $276 million resulted from the program in 1993, of which 95 per cent were passed forward to cargo owners. Australians were found to be the major beneficiaries.

The BTCE found that waterfront reform has resulted in lower costs and increased labour productivity in stevedoring operations. In most ports enterprise as opposed to industry bargaining has created greater identification of interests between employers and employees. In Sydney and Melbourne, and in a small number of minor ports attitudinal change has been slower to develop.

Although flexibility in the allocation of labour has improved, the BTCE found that the use of casual labour is limited and that the present structure of overtime payments is a disincentive to increased productivity.

Multi-skilling of the labour force was found to be a successful outcome of the reform program. The development of combined stevedoring and port authority labour forces in a number of minor ports substantially reduced overall port costs.

The status of waterfront reform is subject to much discussion in the media. BTCE Report 91 provides a comprehensive assessment of the reforms and their impacts up to mid 1994.

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Phone (06) 274 6846
Fax (06) 274 6816

Report 91 may be purchased at any Australian Government Publishing Service Bookshop in your capital city.
Price per copy: $34.95

DEFINITIONS

Elapsed time - the total time the ship is alongside the berth offering for work whether worked or not, measured from labour ordered to last labour ashore.
Elapsed rate - the number of teus moved per elapsed hour.
Net time - the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at the ship operator's request.
Net rate - the number of teus moved per net hour.
Crane rate - the number of teus moved per crane per net hour.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
AGPS	Australian Government Publishing Service
BIE	Bureau of Industry Economics
BTCE	Bureau of Transport and Communications Economics
GRT	Gross Registered Tonnage
MUA	Maritime Union of Australia
PEP	Productivity Employment Proposal
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

REFERENCES

BTCE 1990, *The Cost of Waterfront Unreliability in 1988*, Occasional Paper 101, AGPS, Canberra.
——1995, *Review of the Waterfront Industry Reform Program*, Report 91, AGPS, Canberra.
BIE 1995, *International Benchmarking—Waterfront 1995*, Report 95–16, AGPS Canberra.

TABLE 7 CONTAINER TERMINAL PERFORMANCE INDICATORS, MAJOR AUSTRALIAN PORTS, JUN 91 - JUN 95 QUARTERS

Port	Jun-91	Sep-91	Dec-91	Mar-92	Jun-92	Sep-92	Dec-92	Mar-93	Jun-93	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Past four quarters
Brisbane																		
Ships handled	89	91	91	85	96	93	na	na	na	106	111	112	140	140	187	136	123	579
Total teus	33845	38074	36021	28235	39058	45055	na	na	na	49622	46529	37820	52983	51596	50574	41723	47065	192973
Crane rate	13.4	14.3	14.9	17	18	19.8				21.2	21.1	20.4	20.8	20.3	18.9	18.4	18	18.9
Elapsed rate	16.3	16.9	17.8	19.6	21.2	25.6				26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5
Net rate	17.4	18.2	19.6	21.1	22.9	27.4				29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	23
Sydney																		
Ships handled	114	109	109	105	109	112	na	na	na	205	238	177	240	223	221	218	202	861
Total teus	58075	67601	72250	71702	68359	81287	na	na	na	124028	139321	116914	129586	142659	152326	144868	140113	541485
Crane rate	14.1	15.5	17.5	18.6	19.8	20.9				19.8	20.4	16.4	18.5	16.9	16	18.9	18.1	17.5
Elapsed rate	13.6	16.5	18.4	19.9	22.9	24.1				22.6	22	18.7	20.8	19.4	20.3	21.6	20.7	20.5
Net rate	15.5	18.4	22.7	26.3	31.2	30.4				29.4	28.3	28.3	29.1	25	26.3	28	26.6	26.5
Melbourne																		
Ships handled	117	113	125	108	121	121	na	na	na	235	306	211 r	265	267	244	265	228	987
Total teus	73921	75427	95019	73441	82757	86486	na	na	na	129687	143350	153420	158849	159039	180134	173338	152983	651442
Crane rate	14.1	15.7	14.8	16.7	18.1	19.4				22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.6	19.8
Elapsed rate	17	17.6	18.7	19.2	20.9	22.6				25.9	20	19.5	19.2	17.9	21.5	23.9	23.7	21.8
Net rate	19.8	20.9	20.5	22.1	23.9	24.9				29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	25
Adelaide																		
Ships handled	19	20	21	22	20	21	na	na	na	21	26	28	34	31	33	35	50	126
Total teus	9402	9442	10998	10810	10710	10763	na	na	na	9650	12616	13243	12461	13167	15038	16832	21676	53909
Crane rate	17.7	17	18	19.8	18.7	19.1				19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.4
Elapsed rate	23.2	19.6	25.3	27.2	24.4	25.9				23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.7
Net rate	23.7	20.5	25.9	28.2	25	27.9				26.1	26.6	29.8	25.7	26	25.7	25.3	25.7	25.7
Fremantle																		
Ships handled	74	76	77	71	75	72	na	na	na	116	115	127	135	121	124	128	136	507
Total teus	23696	22713	26522	25403	26572	27690	na	na	na	37566	40910	40587	40986	36635	46969	44388	45308	165177
Crane rate	15.8	15	16.4	21	18.6	20.4				19	19.8	19.8	19.3	21.6	22.9	20.2	19.3	21
Elapsed rate	12.9	12.1	13.1	16.8	15.1	18.2				13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	16.2
Net rate	16.6	15.8	16.4	21	18.6	21.4				19.4	21	19.8	19.5	21.8 r	23.4	21.6	20.5	21.8
Five ports																		
Ships handled	413	409	423	391	421	419	na	na	na	683	796	745	814	782	809	782	739	3150
Total teus	198939	213257	240810	209591	227456	251281	na	na	na	350553	382726	361984	394865	403096	445041	421149	407145	1604986
Crane rate	14.3	15.4	15.9	18	18.7	20.1				20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.1
Elapsed rate	15.4	16.4	17.8	19.4	20.7	23.1				23.4	21	19.2	19.9	18.9	20.4	21.9	21.2	20.6
Net rate	17.7	18.9	20.6	23.3	24.7	26.5				28.2	25.3	25	25	23.4	25.4	26.1	25	25

r revised figure
na not available

Notes 1. From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and the crane rate.
2. indicators are for all quay crane operations on all types of ships calling at the container terminals.

Source WIRA, Patrick, Conaust and Sealand.

BTCE

WATERLINE

DECEMBER 1995 ISSUE NO. 5

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This is the second edition of *Waterline* produced on a quarterly basis. It contains the regular articles on stevedoring performance (quarterly) and the Port Interface Cost Index (six-monthly). Two feature articles on waterfront-related issues cover port performance comparisons with New Zealand and aspects of overseas liner shipping.

The next edition of *Waterline* will be published in March 1996. Regular articles in that edition will cover stevedoring performance and port authority performance. There will also be further feature articles.

Dr Maurice Haddad
Director

IN BRIEF

Port Interface Cost Index

The Bureau's national index indicates that port interface charges per teu rose by 1.9 per cent for imports and by 1.5 per cent for exports in January to June 1995 compared with the previous period. In real terms, overall charges were virtually unchanged.

Road transport charges and customs brokers' fees were the major sources of change in the index over the period. Port and related charges per teu declined in most of the ports.

Stevedoring performance

In the September quarter, the five port average crane rate rose to 19.5 teus per hour following increases in all ports. The five port averages for the net rate and the elapsed rate are now at their highest levels since the September quarter 1993.

The Brisbane crane rate increased to 18.5 teus per hour, the first increase after four consecutive declines.

In Sydney, the crane rate increased to 19.3 teus per hour, and the net rate and the elapsed rate are now at their highest levels since the WIRA program.

Melbourne's crane rate rose slightly to 19.8 teus per hour but is still below the levels achieved in late 1994 and early 1995.

In Adelaide, the crane rate increased to 20.9 teus per hour, the second highest crane rate in the port since the WIRA program.

Fremantle's performance improved slightly to 19.5 teus per hour following declines in the previous two quarters.

Performance comparison with New Zealand

The Bureau has recently undertaken a comparison of performance in several Australian and New Zealand container ports using information provided by shipping lines.

The data indicate that, for the ports included in the comparison, ship based charges and stevedoring are generally less expensive at the New Zealand ports. Wharfage charges for export containers are also lower in New Zealand. Ship handling rates are generally higher in New Zealand for the ports included in the comparison.

Liner shipping

Australia, like many other trading nations, provides international liner shipping with limited and conditional exemptions from its domestic competition regime. While these arrangements allow ocean carriers to cooperate within a conference system, shippers still have the choice of using a conference or an independent non-conference carrier.

Overall, the conference share of Australia's liner trade has declined since the early 1980s. In terms of tonnes carried, the average conference share in the outwards trades fell from 72 per cent in 1982/83 to 55 per cent in 1994/95. The share of independent non-conference carriers has increased by a corresponding amount.

PORT INTERFACE COST INDEX

Changes in the cost parameters for January to June 1995

The representative ship used to calculate port and related charges remained unchanged from the July to December 1994 period (table 1).

The number of teus exchanged per port call changed significantly for several ports. Average teu exchange for the representative ship increased in Sydney (4.5 per cent), Melbourne (3.6 per cent) and Fremantle (3.1 per cent). There were declines in Adelaide (11.8 per cent) and Brisbane (1.2 per cent). Despite the sizeable decline in Adelaide during the first half of 1995, the average number of teus exchanged in the port was still above the figure in the first half of 1994.

Port and related charges

Port and related charges consist of ship based and cargo based charges. Information on these charges is presented in table 2.

In the January to June period, total ship based charges per visit fell by 5.1 per cent in Sydney following a reduction in the Navigation Services Charge (included as a tonnage charge in table 2). There were no changes in scheduled charges at the other ports. However, the combination of time-based charges and changes in elapsed berth times resulted in lower total ship based charges per visit in Melbourne (down 4.1 per cent) and Adelaide (down 1.1 per cent) and higher charges in Fremantle (up 1.6 per cent).

Overall, there were significant reductions in port and related charges (ie ship based and cargo based charges) in several ports during the first half of 1995.

The next update of the Port Interface Cost Index in the June 1996 edition of *Waterline* will include the impact of several recent changes in port charges. These changes include a 9.5 per cent reduction in Fremantle's port pricing (effective 1 July 1995) and an 8.9 per cent reduction in Sydney's pilotage charges (effective 26 October 1995).

The Melbourne data in this issue of *Waterline* incorporate a berth hire charge that is levied by the terminal operators. The former port authority berth hire charge at Swanson Dock was removed from the *Waterline* figures when it was replaced during 1993 and 1994 by an annual berth fee, paid to the port authority by the terminal operators. The terminal operators now levy an hourly berth hire charge at the rate previously charged by the port authority, rather than incorporating the charge in their basic stevedoring charges. As the current berth hire charge is not included in the PSA's monitoring of stevedoring charges, it is now included as a separate component in the *Waterline* figures.

Table 2 indicates that, for an operator of a vessel similar in size to the representative ship, Fremantle had the lowest total ship based charges per ship visit in January to June 1995. It was closely followed by Brisbane and Adelaide.

TABLE 1 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1994/95

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
LOA (metres)	-	-	-	-	176	176	-	-	-	-
Teus exchanged[a]										
Total	322	318	756	790	701	726	338	298	387	399
Loaded	245	245	634	655	591	613	256	232	319	328
Empty	77	73	122	135	110	113	82	66	68	71
Loaded inwards	86	86	383	412	-	-	90	81	-	-
Loaded outwards	159	159	251	243	-	-	166	151	-	-
Primary produce	-	-	-	-	-	-	50	45	-	-
Total empty (% of total)	24	23	16	17	16	16	24	22	18	18
Loaded inwards (% of total)	-	-	51	52	-	-	-	-	-	-
Number of port calls[a]	3	3	3	3	4	4	3	3	5	4
Elapsed berth time (hrs)[a]	-	-	-	-	44	38	24	21	28	31
Mooring time (hrs)	2	2	1.5	1.5	-	-	-	-	-	-
Unmooring time (hrs)	2	2	1	1	-	-	-	-	-	-

– *not required.*

a. *Mean value for ships between 15 000 and 20 000 grt.*

Source *BTCE estimates based on ship call data supplied by port authorities and other port service providers.*

TABLE 2 PORT AND RELATED CHARGES, 1994/95

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995
Ship based charges ($/teu)										
State government	9.78	9.91	-	-	-	-	5.34	6.05	2.04	1.98
Tonnage	-	-	12.30	10.02	14.49	13.99	13.01	14.00	7.47	8.03
Pilotage	15.93	16.13	4.94	4.72	7.83	7.56	6.95	7.89	6.39	6.20
Towage	31.43	31.82	12.93	12.37	10.49	10.12	36.39	41.28	29.15	28.27
Mooring & unmooring	3.12	3.16	5.88	5.63	3.35	3.24	-	-	3.63	3.52
Berth hire[a]	-	-	-	-	15.00[r]	12.44	-	-	-	-
Total ship based charges										
$/teu	60.26	61.02	36.04	32.75	51.15[r]	47.35	61.69	69.22	48.69	48.00
$/visit	19 404	19 404	27 248	25 871	35 858[r]	34 376	20 851	20 626	18 843	19 153
Cargo based charges ($/teu)										
Wharfage	26.00	26.00			46.75	46.75			49.79	49.79
Imports			65.00	60.00			75.00	65.00		
Exports			50.00	45.00			67.74	62.00		
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berthing	-	-	-	-	-	-	-	-	14.63	14.63
Total port and related charges ($/teu)										
Loaded imports	128.26	129.02	101.04	92.75	97.90[r]	94.10	136.69	134.22	113.11	112.42
Loaded exports	128.26	129.02	86.04	77.75	97.90[r]	94.10	129.43	131.22	113.11	112.42
Empties	74.51	75.27	71.04	57.75	64.75[r]	60.95	61.69	69.22	67.15	66.46

- not applicable

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

r figures revised to include berth hire charge.

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

Source BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers.

The level of ship based charges per teu provides an indication of the impact of these charges on shippers. This measure is affected by changes in the number of teus exchanged per ship call in a port. With a given level of charges per ship visit, a reduction in the number of teus exchanged will increase the cost per teu of bringing the ship into the port. Conversely, an increase in teus exchanged will reduce the cost per teu.

In Sydney, ship based charges per teu fell by 9.1 per cent in the January to June period in response to the reduction in the Navigation Services Charge and the increase in the number of teus exchanged per ship call. There was a decline of 7.4 per cent in Melbourne as a result of the higher teu exchange and the lower berth hire charge per ship visit caused by the lower elapsed berth time.

Ship based charges per teu fell slightly in Fremantle in response to the increase in the average teu exchange. They increased in Adelaide, with the fall in the number of teus exchanged per ship visit outweighing the reduction in tonnage charges per ship visit that resulted from lower elapsed berth time. There was a small increase in Brisbane as a result of the decline in the number of teus exchanged per ship call.

Cargo based charges also changed in two ports. In Sydney, wharfage was reduced by $5 per teu for a loaded container. In Adelaide, wharfage was reduced by $10 per teu for a full dry general purpose import or export container and by $7.10 per teu for an export reefer container. Wharfage for a primary produce export container in Adelaide was increased by $4.20 per teu.

Overall, there were significant reductions in port and related charges (ie ship based and cargo based charges) in several ports during the first half of 1995. On a per teu basis, port and related charges for loaded export containers fell by 9.6 per cent in Sydney, 4.6 per cent in Melbourne and 0.6 per cent in Fremantle. Rises of 1.4 per cent in Adelaide and 0.6 per cent in Brisbane were driven by falls in the number of teus exchanged per ship call in these ports.

Stevedoring charges

The stevedoring charges used in this issue of *Waterline* are those published in the most recent PSA report on stevedoring prices (PSA 1995). As these prices refer to the first half of 1994, they will need to be revised when the PSA publishes its results for 1995.

TABLE 3 PORT INTERFACE COSTS, 1994/95

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1994	Jan-Jun 1995
Imports										
Ship based charges	60	61	36	33	51[r]	47	62	69	49	48
Cargo based charges	68	68	65	60	47	47	75	65	64	64
Stevedoring[a]	196[r]	196	196[r]	196	196[r]	196	196[r]	196	196[r]	196
Customs brokers' fees	133	125	142	153	149	149	135	152	135	152
Road transport	175	175	272	300	240	245	142	142	177	185
Total imports	632	625	711	742	683	684	610	625	621	646
Exports										
Ship based charges	60	61	36	33	51[r]	47	62	69	49	48
Cargo based charges	68	68	50	45	47	47	68	62	64	64
Stevedoring[a]	196[r]	196	196[r]	196	196[r]	196	196[r]	196	196[r]	196
Customs brokers' fees	92	84	89	101	91	91	84	74	84	74
Road transport	175	175	272	300	240	245	142	142	177	185
Total exports	591	584	643	674	624	626	552	543	570	568

a. Provisional pending updating of stevedoring figures by the PSA.

r figures revised since publication of Waterline 3.

Note 1. Based on parameters described in table 1.
2. Components may not add to totals due to rounding.

Source BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators. Stevedoring charges are the January - June 1994 figure obtained by PSA (1995).

The national weighted-average revenue per teu for the sample of container terminal operations covered by the PSA was $196 in the first half of 1994. This represented an increase of 1.6 per cent over the 1993 average of $193.

Land based charges

Land based charges consist of customs brokers' fees and road transport charges. Changes in these components are detailed in table 3.

Customs brokers' fees for import and export containers increased in Sydney by $11-$12 per teu and declined in Brisbane by $8 per teu in January to June 1995 compared with the previous period. For Adelaide and Fremantle, the Bureau's survey of customs brokers indicated that fees increased by $17 per teu for import containers and declined by $10 per teu for export containers. There was no change in customs brokers' fees in Melbourne.

The different fee changes for export and import containers in Adelaide and Fremantle indicate some volatility in the market, possibly as brokers adjust to the system of optional port of lodgement. The sample size for estimating brokers' fees in Adelaide and Fremantle is small, and this increases the volatility of the estimates. The Bureau continues to work on increasing the sample size for these ports.

Port and related charges per teu declined in most of the ports in the first half of 1995, but road transport charges and customs brokers' fees were generally the major sources of change in shore based shipping costs.

Road transport charges at the ports increased by $28 per teu in Sydney, $8 per teu in Fremantle and $5 per teu in Melbourne. The relatively large increase at Sydney partly reflects increases in general vehicle operating costs. Road transport charges were unchanged in Brisbane and Adelaide.

TABLE 4 THE NATIONAL PORT INTERFACE COST INDEX

($/teu)

	Jul-Dec 1992	Jan-Jun 1993	Jul-Dec 1993	Jan-Jun 1994	Jul-Dec 1994[a]	Jan-Jun 1995[a]	Change[b]
Imports	691	680[r]	680[r]	685[r]	680[r]	693	0.20%
Exports	613	613[r]	623[r]	629[r]	619[r]	628	2.60%

a. Based on January-June 1994 stevedoring charges (PSA 1995).

b. Percentage change since Jul-Dec 1992.

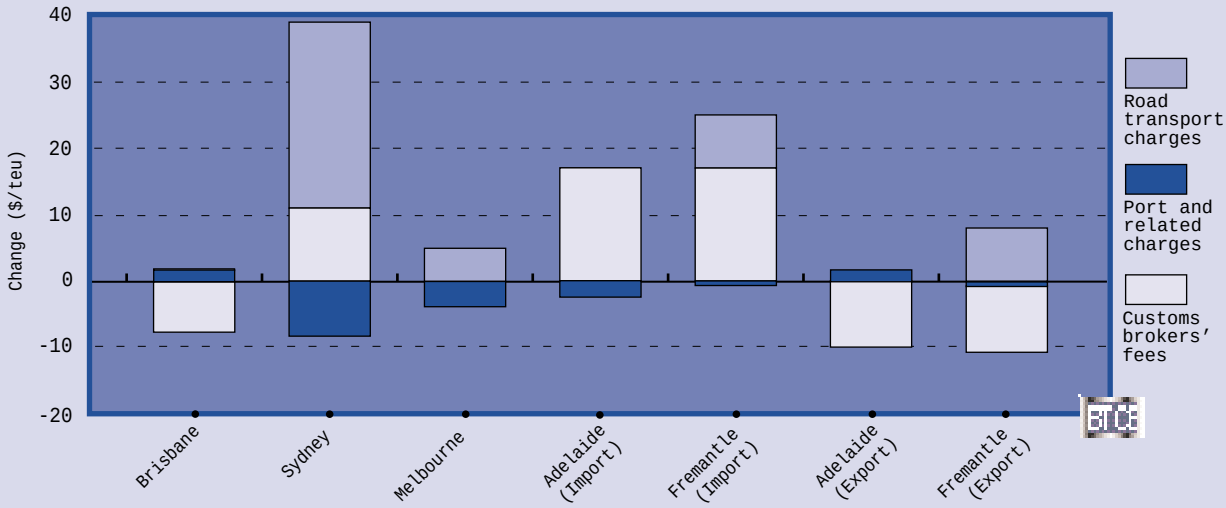
r figures revised to include Melbourne berth hire charge.

Source BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; PSA (1995).

Movements in the index

Table 3 provides details of the Port Interface Cost Index for individual ports. It indicates

FIGURE 1 SOURCES OF CHANGES IN SHORE BASED SHIPPING COSTS FOR INDIVIDUAL PORTS BETWEEN JULY TO DECEMBER 1994 AND JANUARY TO JUNE 1995



Source *BTCE estimates based on: price schedules of port authorities, towage operators and pilotage service providers; survey of customs brokers and road transport operators; and PSA (1995).*

that shore based shipping costs per teu declined in Brisbane, increased in Sydney, increased for imports and declined for exports in Adelaide and Fremantle, and were virtually unchanged in Melbourne.

The national index indicates that there has been an overall increase in port interface charges per teu in January to June 1995. However, in real terms, overall charges were virtually unchanged from the previous period.

The sources of change in the index for each port are shown in figure 1. Port and related charges per teu declined in most of the ports, but road transport charges and customs brokers' fees were generally the major sources of change in the index between July-December 1994 and January-June 1995. Road transport and customs broking are reasonably competitive industries, and prices can respond quickly to changing market conditions. Greater volatility can therefore be expected in charges for these activities than in port and related charges.

In the first half of 1995, shore based shipping costs per teu declined in Brisbane, increased in Sydney, increased for imports and declined for exports in Adelaide and Fremantle, and were virtually unchanged in Melbourne.

The national index (table 4) indicates that there has been an overall increase in port interface charges per teu in January to June 1995 compared with the previous period. The import index increased by 1.9 per cent and the export index rose by 1.5 per cent. When deflated by the gross non-farm product implicit price deflator, the import index shows an increase of 0.2 per cent and the export index shows a decrease of 0.3 per cent.

STEVEDORING PERFORMANCE INDICATORS

Average crane rates increased in all ports in the September quarter (figure 2). The five port average crane rate rose to 19.5 teus per hour, although this is still below the March quarter figure of 19.9 teus per hour. The five port averages for the net rate and the elapsed rate are now at their highest levels since the September quarter 1993.

Average crane rates increased in all ports in the September quarter. The five port averages for the net rate and the elapsed rate are now at their highest levels since the September quarter 1993.

Figure 2 also includes information on movements in stevedoring performance since the end of the WIRA program in September 1992. It indicates that performance fell away markedly in the 12 months after September 1993. Since then, most of the lost ground has been recaptured, with the five port

average figures increasing in three of the four most recent quarters. The average time to stevedore 560 teus was 24.8 hours in the September quarter 1995 compared with 24.2 hours at the end of the WIRA period.

These results suggest that the overall performance gains during the WIRA period have largely been sustained. However, they also highlight the fact that, to date, the industry has not been able to achieve the continuous improvement that is necessary to make Australian ports competitive internationally.

Figures 3 to 7 provide information on stevedoring performance in the individual ports. Time series information on container terminal performance from the *Waterline* database is contained in table 6 (page 15).

Performance for Brisbane improved during the September quarter (figure 3). The crane rate increased to 18.5 teus per hour from 18.0 teus per hour in the previous quarter, the first increase after four consecutive declines. The September quarter crane rate was the highest figure since the December quarter 1994. The net rate and the elapsed rate also increased during the September quarter, reflecting a small increase (2.5 per cent) in crane intensity and a reduction in the time not worked.

In Sydney the crane rate increased to 19.3 teus per hour for the September quarter, up from 18.1 teus per hour in the previous quarter (figure 4). This rise more than reversed the decline that occurred in the June quarter. The September quarter figure is the highest crane rate in Sydney since the December quarter 1993. The net rate and the elapsed rate also increased in the September quarter, and they are now at their highest levels since the end of the WIRA program. The introduction of the Productivity Employment Proposal for the CTAL terminal in Sydney has been delayed but is expected to occur in 1996.

Melbourne's crane rate increased slightly to 19.8 teus per hour in the September quarter from 19.6 teus per hour in the previous quarter (figure 5). However, it is still below the levels achieved in late 1994 and early 1995. The net rate and the elapsed rate also increased during the September quarter. The elapsed rate is at the highest level in the port since the September quarter 1993.

Within each port the crane rate differs for individual ship calls. In addition, the average crane rate in a port varies over time and there are significant differences in the rates at individual ports in Australia. A range of factors contribute to these variations in performance.

Adelaide's performance improved during the September quarter (figure 6). The crane rate rose to 20.9 teus per hour from 20.2 teus per hour in the June quarter, partly reversing the decline in the previous period. The September quarter figure is the second highest crane rate achieved in the port over the period covered by the *Waterline* figures. The elapsed rate was virtually unchanged in the September quarter and the net rate increased.

In Fremantle, the crane rate rose slightly to 19.5 teus per hour in the September quarter, up from 19.3 teus per hour in the previous quarter (figure 7). This increase followed declines in the previous two periods. The net rate and the elapsed rate also improved in the September quarter. The effect of industrial disruption in the June quarter is clearly seen in the depressed elapsed rate during that quarter. The proportion of time not worked improved significantly to 16.3 per cent in the September quarter, probably reflecting a more regular pattern of ship arrivals.

Stevedores are increasingly basing their charges and performance measurement on lifts rather than teus. This trend suggests that the number of lifts may provide an alternative measure of changes in container terminal productivity, particularly in circumstances where there is a significant change over time in the mix of 20 foot and 40 foot containers. The Bureau is therefore investigating the feasibility of preparing indicators based on the number of lifts to supplement the existing measures of stevedoring performance based on teus.

Factors affecting crane rates

Figures 3 to 7 are based on average crane rates but within each port the crane rate differs for individual ship calls. In addition, the average crane rate in a port varies over time and there are significant differences in the rates at individual ports in Australia. A range of factors contribute to these variations in performance.

The crane rate achieved during a particular ship visit is affected by the design and condition of the ship. Relevant features include the absence or availability of cell guides, the configuration of the cells (for 40 foot or 20 foot containers), arrangements for above-deck stacking (fore and aft or athwartships), whether hatch covers are installed, and the age and condition of the ship's fittings. The number of containers exchanged is also an important influence - other things being equal, exchange of a larger number of containers will facilitate a higher crane rate during a particular ship visit. In addition, the layout of cargo on the ship will affect the crane rate, with a lower rate if the cargo for the port is spread throughout the ship (as opposed to being stowed together in one

FIGURE 2 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS

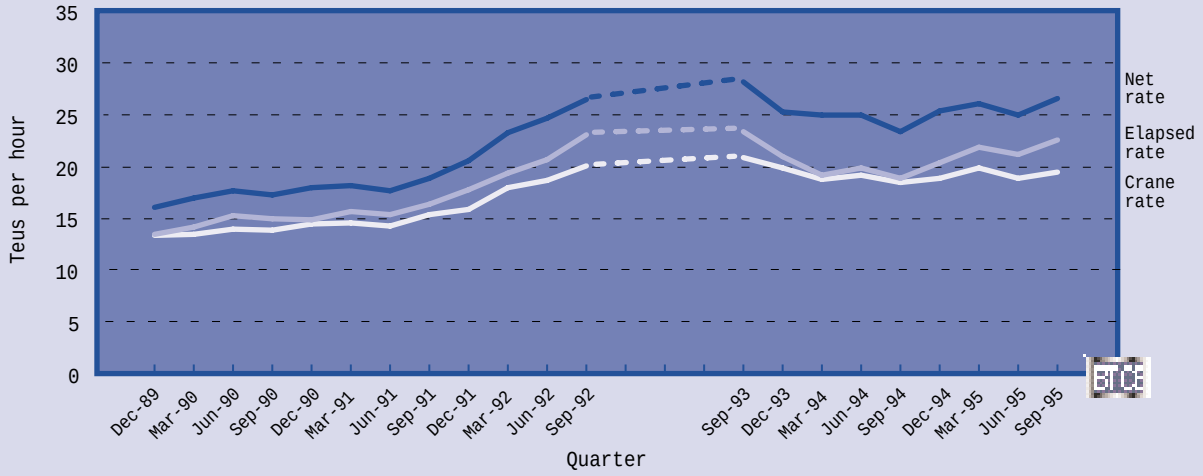


FIGURE 3 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS

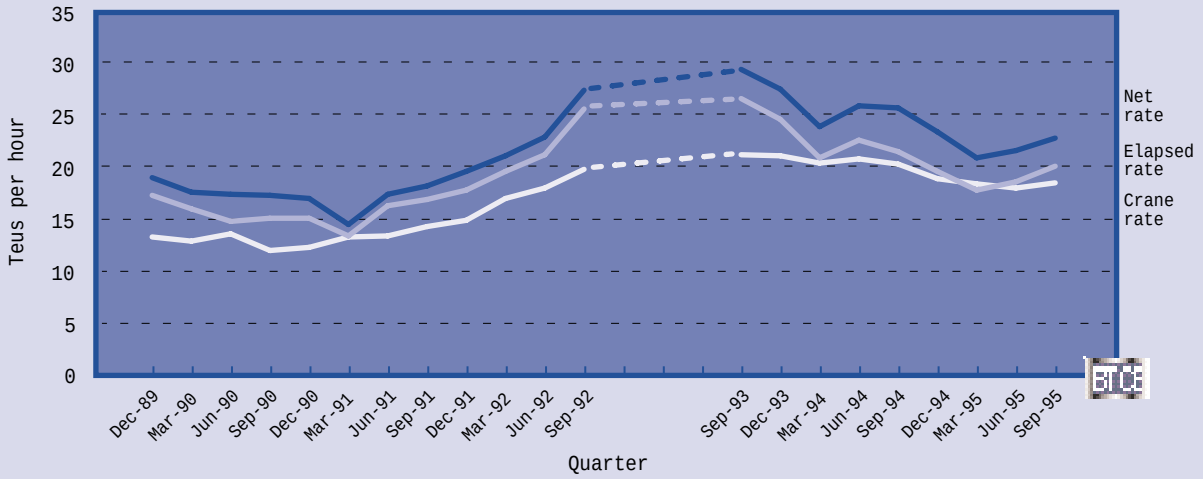
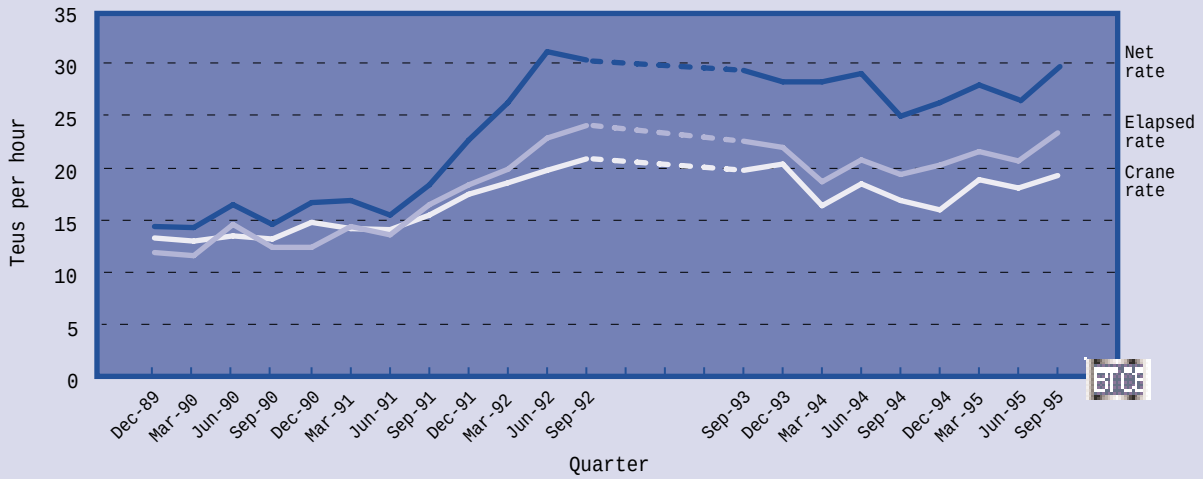


FIGURE 4 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and the crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick, Conaust and SeaLand.*

FIGURE 5 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS

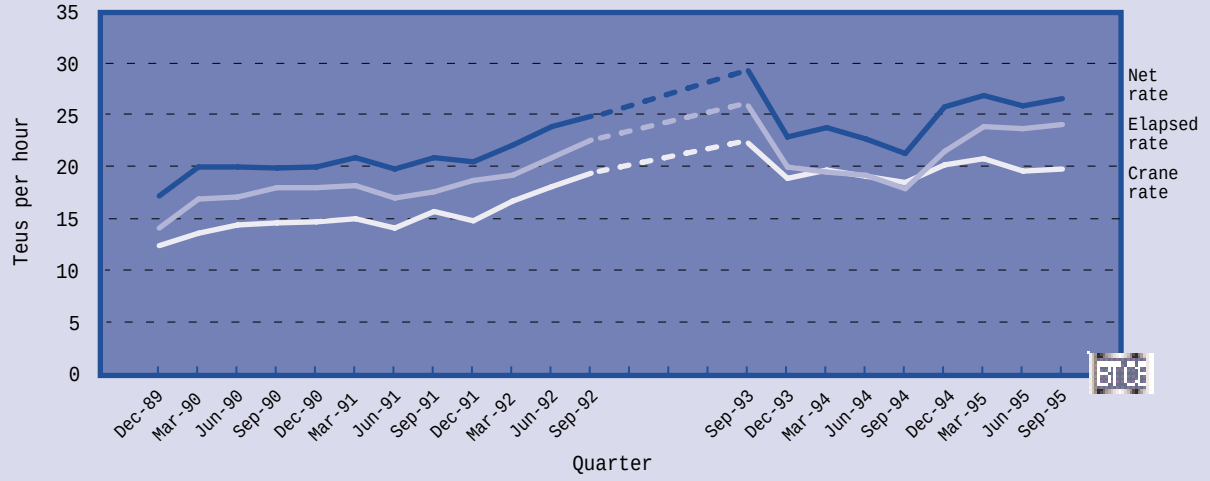


FIGURE 6 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS

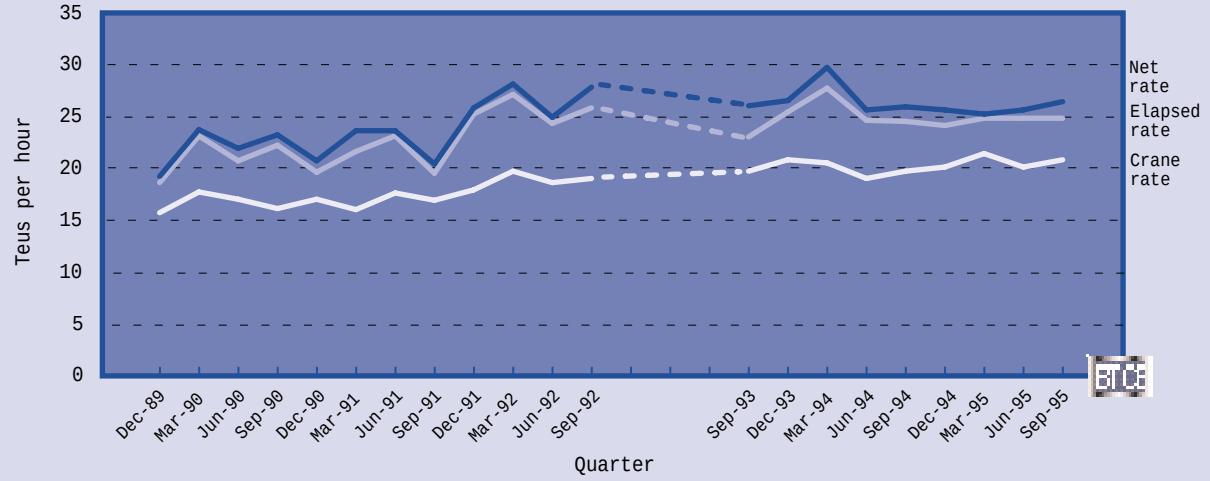
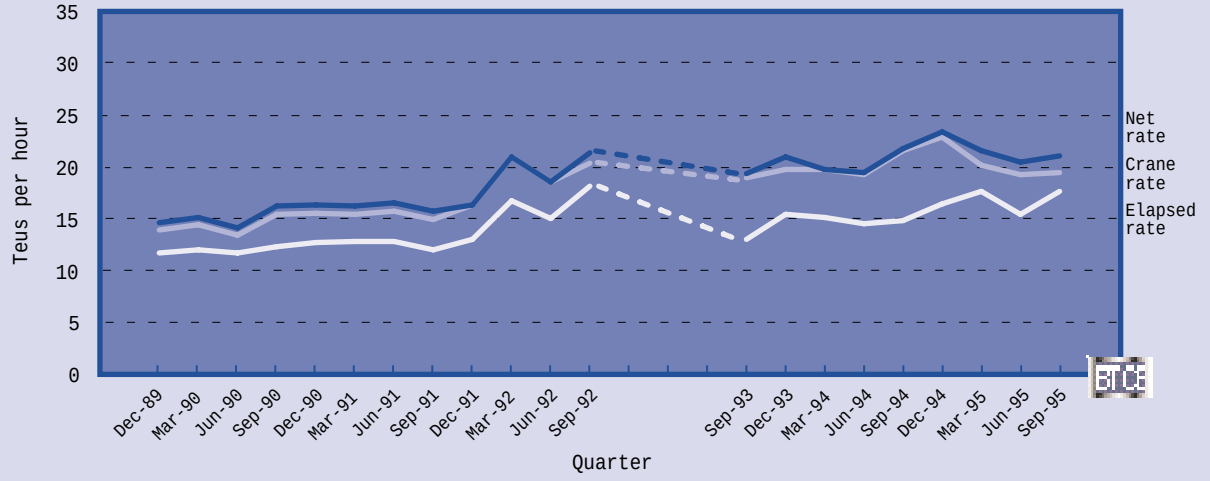


FIGURE 7 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and the crane rate. Data unavailable for December 1992 to June 1993.*

Source *WIRA, Patrick, Conaust and SeaLand.*

area) or if a high proportion of the cargo is stowed on deck.

Stevedores have commented that crane rates are also affected by late receivals of cargo, poor import and export information from shipping lines, and late notice of changes to the stowage plan. The enforcement of export receival cut-offs plus strict control of changes to stowage plans, once vessel operations commence, are currently being trialed.

The quarterly variation in the crane rate at each port potentially reflects the impact of several factors. These include changes in the average number of containers exchanged per ship visit, terminal congestion, equipment breakdowns, disruption associated with upgrading of facilities, and working relationships within the terminals. In some periods, handling rates at all or most of the five major ports have moved in the same direction, reflecting the impact of broad influences such as waterfront reform or industrial disputes with a national focus.

Longer term trends in performance are most likely to emerge when there are fundamental changes such as the gains from the WIRA program. Specific initiatives that facilitate increases in productivity include large-scale upgrading of terminal equipment, sustainable improvements in work practices and major changes in industrial relations. Current initiatives to promote long-term improvements in container terminal productivity include major upgrading of equipment at Australian ports and negotiation of the Productivity Employment Proposal at the CTAL terminal in Sydney.

Various factors potentially contribute to the variation in crane rates between ports. They include inter-port differences in the average number of containers exchanged per ship visit, typical layout of cargo for the port, terminal congestion, working relationships within the terminals and the nature of terminal facilities (including equipment and physical integration of facilities). These factors should be considered when assessing inter-port differences in crane rates.

Time not worked

The difference between the elapsed time and the net time (see definitions on page 13) provides a measure of the time the ship is available to be worked but lies idle. Data presented in *Waterline 4* showed that the average proportion of elapsed time not worked for the five ports declined over the period from the March quarter 1994 to the June quarter 1995. This means that, on average over the period, less time was being lost due to poor weather, awaiting cargo, industrial disputes, closed holidays, factors associated with the ship's fault and shifts not worked at the ship operator's request. However, there was no consistent trend for individual ports.

In the September quarter 1995, the average proportion of elapsed time not worked for the five ports fell to 14.9 per cent, compared with 15.2 per cent in the previous quarter. Individual ports which reported a decline were Fremantle (from 24.4 per cent to 16.3 per cent), Brisbane (from 14.0 per cent to 11.9 per cent) and Sydney (from 22.2 per cent to 21.6 per cent). The proportion of elapsed time not worked increased in Adelaide (from 3.1 per cent to 6.0 per cent) and in Melbourne (from 8.3 per cent to 9.4 per cent).

INTERNATIONAL COMPARISONS - NEW ZEALAND

The Bureau has recently commenced work on international comparisons of waterfront performance for containers. The work is being undertaken progressively by region, using data provided by shipping lines. The Bureau's analysis is based on the port charges and performance actually experienced by shipping lines. It includes charges that are negotiated directly with stevedores or port authorities and incorporates discounts off scheduled charges.

There are difficulties with drawing firm conclusions about relative efficiency from such international comparisons, since performance is affected by local conditions beyond industry control such as geography and the adequacy of other land-based infrastructure. However, a partial analysis of this kind does provide some indication of the relative performance of Australia's waterfront.

Overall, the data on port charges in Australia and New Zealand indicate that ship based and stevedoring charges are generally less expensive at the New Zealand ports.

The first international comparison involves New Zealand where major waterfront reforms commenced in 1988. The New Zealand reforms have included the establishment of port companies with a strong commercial focus and the introduction of company-based employment. Work practices and industrial relations on the New Zealand waterfront have also been affected by the *Employment Contracts Act 1991*.

The Bureau asked several shipping lines to provide data on charges and handling rates at major ports visited by their

ships in Australia and New Zealand. Four lines responded with data on container traffic. Their operations involved the trans-Tasman trade and services between Australasia and other parts of the world. A fifth respondent provided information on a breakbulk service which also carried some containers.

Each line provided data based on the operations of one or more of its ships so that, for a particular line, performance across ports was always based on the same ship and cargo characteristics. The capacities of the container ships ranged from the 250-500 teu category to the 1500-1750 teu category. The lines considered that the comparisons would not be significantly affected by any inter-port variations in average cargo exchanges, cargo layout or time in port.

The information on waterfront charges and handling rates provided by the four container lines is summarised in table 5. It is presented in index form to maintain the confidentiality of commercially sensitive information. Each line's charges and handling rate are set at 100 for Sydney, with its figures for other ports being indexed relative to this base. There was significant variation in actual charges and handling rates for individual lines in Sydney as a result of factors such as differences in ship characteristics.

Three lines provided data on ship based charges. Table 5 indicates that these charges were much lower in the New Zealand ports. One line had very low charges in New Zealand, apparently as a result of several factors such as pilot exemptions for its masters and the size of its ships. Additional data provided by one line (not included in table 5) suggested that ship based charges in Brisbane were below those for Sydney but above the charges in Napier, Tauranga and the New Zealand ports in table 5.

Wharfage charges for export containers are lower in New Zealand.

Two lines provided information on wharfage charges. Table 5 indicates that there was no consistent pattern in relative charges for imports but that the New Zealand ports had lower charges for exports. The lines advised that there were no other cargo-based charges in any of the ports in table 5.

Information on stevedoring charges was provided by four lines. Table 5 indicates that these charges were much lower in the New Zealand ports. Additional data provided by two of the lines suggested that stevedoring charges in Brisbane were slightly below those in Sydney but above the charges in Napier, Tauranga and the New Zealand ports in table 5.

The commonly used measure of container terminal productivity in Australia for international comparisons is the crane rate. However, only one line was able to provide data on this basis and hence table 5 focuses on information on ship handling rates provided by four lines. The data indicate that the ship handling rates in Auckland and Wellington were generally higher than the rates in Sydney and Melbourne.

The ship handling rates reported by the lines are similar to the net rate used in *Waterline* but also differ from this measure in some respects. Nevertheless, the definition used by each line is consistent across all ports in the analysis and the data therefore provide a valid comparative measure of productivity.

In addition to the data for the container lines in table 5, the shipping line carrying break-bulk cargo and some containers on trans-Tasman services provided data on relative port costs and handling rates in four Australian ports and four New Zealand ports. This information

TABLE 5 RELATIVE CHARGES AND HANDLING RATES FOR CONTAINERS IN SELECTED AUSTRALIAN AND NEW ZEALAND PORTS, 1995

(Index: Sydney = 100)

Performance area	Sydney	Melbourne	Auckland	Wellington	Lyttelton
Ship-based charges[a]	100	164-171	18-48	26-41	26-51
Wharfage - Imports[b]	100	78	115	46-64	100
Wharfage - Exports[b]	100	104	93	62-85	67-68
Stevedoring charges[c]	100	96-102	51-87	59-81	60-75
Ship handling rate[d]	100	96-124	112-190	126-145	na

a. Charges per ship visit. Includes tonnage charges, pilotage, towage, mooring/unmooring, navigation charges, conservancy dues, berth hire and utilities charges as appropriate. Excludes Marine Navigation Levy and Oil Pollution Levy.
b. Charge per teu.
c. Charge per teu or per lift.
d. Teus or lifts per hour using shore gantry.
na Not available on a comparable basis.

Source Derived from data supplied by shipping lines.

indicated that port charges (excluding wharfage) were generally lower in New Zealand. Relative productivity was less clear-cut, with the highest and lowest figures both being in Australian ports.

Overall, the data provided by the lines which participated in the Bureau's study indicate that ship based and stevedoring charges are generally less expensive at the New Zealand ports. Wharfage charges for export containers are lower in New Zealand. Ship handling rates are generally higher in New Zealand for the ports included in the study.

In considering these results, it should be recognised that the analysis was based on partial information on waterfront charges and handling rates. The number of ports was limited, although they accounted for a large proportion of international container traffic in each country. In addition, some aspects of waterfront charges, such as customs brokers' fees and road transport charges, were excluded from the analysis.

Ship handling rates are generally higher in New Zealand for the ports included in the study.

The conclusions from the comparisons of charges may also be affected by the exchange rate used (A$1=NZ$1.15). However, even with the recent peak rate for the New Zealand currency of A$1=NZ$1.06, the indexed charges for the New Zealand ports would rise by less than 9 per cent. The significant gaps between charges in the two countries, identified in table 5, would remain.

LINER SHIPPING

A liner cargo shipping service is a scheduled service for the transport of various types of general (non-bulk) cargo by sea on particular routes, usually by container and at predetermined freight rates. Shipping lines serving the international liner trades operate within conferences or independently (ie as non-conference carriers).

Australia, like many other trading nations, provides international liner shipping with limited and conditional exemptions from its domestic competition regime in order to permit liner conferences to operate. Shippers still have the choice of using a conference or an independent carrier.

For the purpose of the statistics in this article, a 'conference' means an unincorporated association of two or more ocean carriers carrying on two or more businesses, each of which includes the provision of liner cargo shipping services. This is based on the definition in Part X of the *Trade Practices Act 1974* dealing with international liner cargo shipping.

Australia, like many other trading nations, provides international liner shipping with limited and conditional exemptions from its domestic competition regime in order to permit liner conferences to operate. This is done via Part X of the *Trade Practices Act 1974*.

The prime objective of Part X is to ensure that Australian exporters have continued access to liner cargo shipping services of adequate frequency and reliability at freight rates that are internationally competitive. This is achieved through providing shippers with countervailing power and through various review and inquiry mechanisms.

While Part X allows ocean carriers to cooperate within a conference system, shippers still have the choice of using a conference or an independent carrier. The statistics in this article indicate the relative shares of liner cargo carried by conference and independent non-conference carriers.

In general, cargo carried by conference lines has a higher average value than the cargo carried by non-conference operators. This probably reflects some service quality advantages of conferences, such as more frequent sailings and greater reliability, which are particularly attractive to shippers of reefer (refrigerated) and other high value cargoes. It should be noted that conference reefer capacity is considerably larger than that provided by non-conference operators as a result of the higher investment in this type of equipment by conference operators.

Conference share

Overall, the conference share of Australia's liner trade has declined since the early 1980s. In terms of tonnes carried, the average conference share in the outwards trades fell from 72 per cent in 1982/83 to 55 per cent in 1994/95. It has remained fairly steady around 55-56 per cent since 1990/91. The share of independent non-conference carriers has increased by a corresponding amount.

Overall, the conference share of Australia's liner trade has declined since the early 1980s. The conference share of individual liner trades has varied significantly on an annual basis.

Figures 8 and 9 show the conference share of outwards traffic in five major Australian liner trades between 1982/83 and 1994/95. Figure 8 covers three short-haul trades (Japan and North Asia, South East

Asia, East Asia) and Figure 9 covers two long-haul trades (Europe, North America).

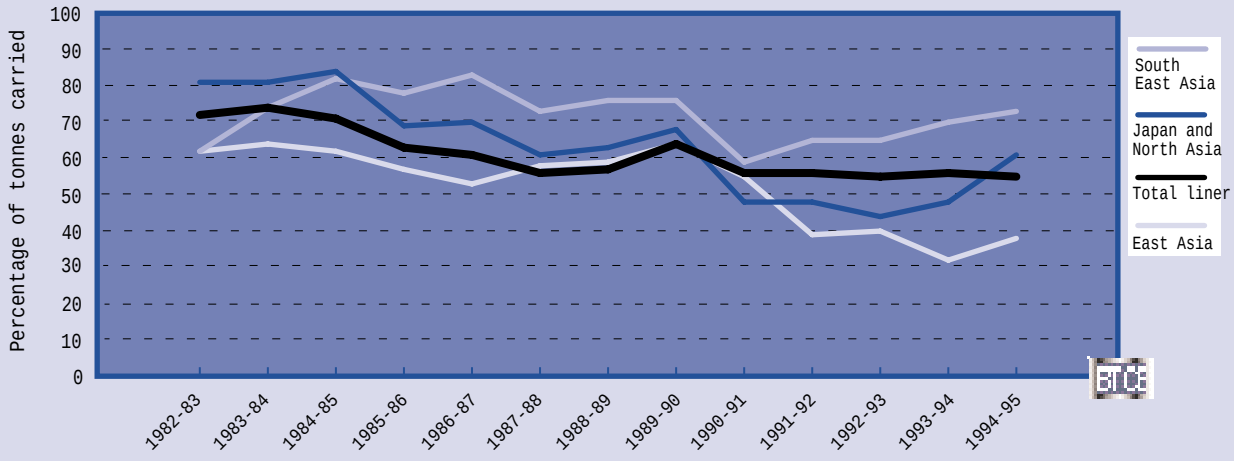
The conference share of individual short-haul liner trades has varied significantly on an annual basis over the period covered by these figures. On two routes there are recent signs of increasing conference share. In the South East Asia trade, the conference share recovered from its low point in 1990/91 to reach 73 per cent in 1994/95, higher than the share in 1982/83 and the highest of any Australian trade in 1994/95. The conference share in the Japan and North Asia trade has also risen over the last two years, although the share of 61 per cent in 1994/95 is still well below the 81 per cent share achieved in 1982/83.

The East Asia trade includes China, Hong Kong, Taiwan and the Philippines. The quantity and value of exports to this area have increased fourfold in ten years and imports have doubled in quantity and almost tripled in value. A large portion of the Chinese trade is serviced by transhipment through Hong Kong. The conference share of the outwards liner trade from Australia to East Asia declined from 62 per cent in 1982/83 to 38 per cent in 1994/95.

Conference shares have declined in the two long-haul outwards trades covered in figure 9. In the Europe trade, the conference share fell from 81 per cent in 1983/84 to 39 per cent in 1994/95, mostly as a result of strong non-conference price competition. Industry sources suggest that, in terms of teus, the conference share in the Europe trade is closer to 50 per cent. In the North America trade, the conference share declined from 53 per cent in 1982/83 to 42 per cent in 1994/95, despite a peak of 58 per cent in 1992/93.

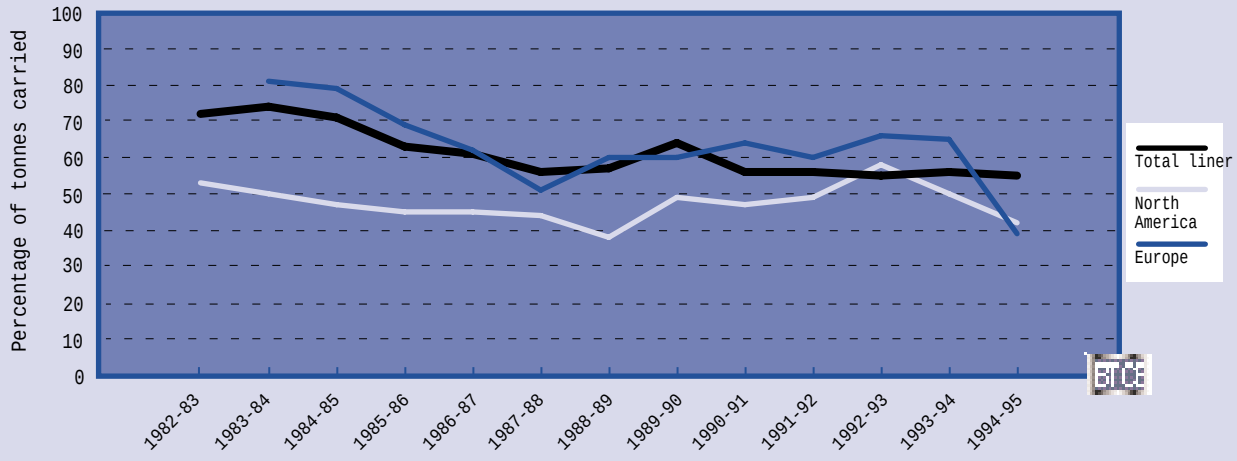
The changes in conference shares reflect several factors, with the major influences sometimes varying between trades. They include the movement of individual lines into or out of conferences, the withdrawal of lines from specific trades, and the entry of non-conference operators with large teu capacity.

FIGURE 8 CONFERENCE SHARE OF THE AUSTRALIAN LINER MARKET, OUTWARDS BY QUANTITY - ASIAN TRADES



Source ABS (1995).

FIGURE 9 CONFERENCE SHARE OF THE AUSTRALIAN LINER MARKET, OUTWARDS BY QUANTITY — EUROPE AND NORTH AMERICA TRADES



Source ABS (1995).

DEFINITIONS

Elapsed time - the total time the ship is alongside the berth offering for work whether worked or not, measured from labour ordered to last labour ashore.

Elapsed rate - the number of teus moved per elapsed hour.

Net time - the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at the ship operator's request.

Net rate - the number of teus moved per net hour.

Crane rate - the number of teus moved per crane per net hour.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
AGPS	Australian Government Publishing Service
BTCE	Bureau of Transport and Communications Economics
CTAL	Container Terminals Australia Limited
GRT	Gross Registered Tonnage
LOA	Length Overall
NRT	Net Registered Tonnage
PSA	Prices Surveillance Authority
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

REFERENCES

ABS 1995, *International Cargo Statistics 1994-95*, ABS, Canberra.

PSA 1995, *Monitoring of Stevedoring Costs and Charges and Terminal Handling Charges*, Number 5, Monitoring Report No. 26, PSA, Melbourne.

BTCE MARITIME RESEARCH

The Bureau of Transport and Communications Economics (BTCE) undertakes research relevant to the policy interests of the Department of Transport and the Department of Communications and the Arts. The research covers maritime, aviation, transport externalities, land transport and communications issues.

The BTCE's annual research program is designed to inform public debate and to assist policy formulation processes. The results of its planned research projects are usually published and distributed widely. In addition, the BTCE responds to requests for information, policy analysis and advice from Ministers, Parliamentary Committees and Departmental Policy Divisions.

The maritime area has three high priority projects under way:

- Continuing production of our newsletter *Waterline*, which provides data and commentary principally on port performance but also on broader maritime issues when appropriate;
- Evaluation of changing trends in the patterns of international liner shipping and their impact on Australian shippers and shipping, and the demand for port services;
- A joint project with the Indonesian Government to investigate transport synergies between eastern Indonesia and northern Australia.

Information of the BTCE's maritime research can be obtained from the Research Manager, Sue Elderton, (06) 274 6800. Information on individual projects is also available from the project leaders. For *Waterline*, contact Kym Starr, (06) 274 6857. For the globalisation and Indonesian projects, contact Neil Gentle, (06) 274 6735.

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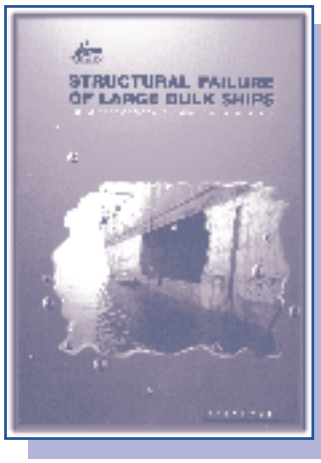

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Port Interface Cost Index

Report 84

The background and original assumptions of the Port Interface Cost Index are published in this report.

AGPS Cat. No. 93 2428 2 **$5.95**

TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, MAJOR AUSTRALIAN PORTS, SEP 91 - SEP 95

Port	Sep-91	Dec-91	Mar-92	Jun-92	Sep-92	Dec-92	Mar-93	Jun-93	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Past four quarters
Brisbane																		
Ships handled	91	91	85	96	93	na	na	na	106	111	112	140	140	187	136	123	135	581
Total teus	38074	36021	28235	39058	45055	na	na	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	198213
Crane rate	14.3	14.9	17.0	18.0	19.8	na	na	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.5	18.4
Elapsed rate	16.9	17.8	19.6	21.2	25.6	na	na	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	20.1	19.1
Net rate	18.2	19.6	21.1	22.9	27.4	na	na	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.8	22.3
Sydney																		
Ships handled	109	109	105	109	112	na	na	na	205	238	177	240	223	221	218	202	192	833
Total teus	67601	72250	71702	68359	81287	na	na	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	585738
Crane rate	15.5	17.5	18.6	19.8	20.9	na	na	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.1
Elapsed rate	16.5	18.4	19.9	22.9	24.1	na	na	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.5
Net rate	18.4	22.7	26.3	31.2	30.4	na	na	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	27.7
Melbourne																		
Ships handled	113	125	108	121	121	na	na	na	235	306	211	265	267	244	265	228	221	958
Total teus	75427	95019	73441	82757	86486	na	na	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	668398
Crane rate	15.7	14.8	16.7	18.1	19.4	na	na	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.6	19.8	20.1
Elapsed rate	17.6	18.7	19.2	20.9	22.6	na	na	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	23.2
Net rate	20.9	20.5	22.1	23.9	24.9	na	na	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.3
Adelaide																		
Ships handled	20	21	22	20	21	na	na	na	21	26	28	34	31	33	35	50	34	152
Total teus	9442	10998	10810	10710	10763	na	na	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	67865
Crane rate	17.0	18.0	19.8	18.7	19.1	na	na	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	20.7
Elapsed rate	19.6	25.3	27.2	24.4	25.9	na	na	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	24.7
Net rate	20.5	25.9	28.2	25.0	27.9	na	na	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	25.8
Fremantle																		
Ships handled	76	77	71	75	72	na	na	na	116	115	127	135	121	124	128	136	139	527
Total teus	22713	26522	25403	26572	27690	na	na	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	186715
Crane rate	15.0	16.4	21.0	18.6	20.4	na	na	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	20.5
Elapsed rate	12.1	13.1	16.8	15.1	18.2	na	na	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	16.8
Net rate	15.8	16.4	21.0	18.6	21.4	na	na	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	21.7
Five ports																		
Ships handled	409	423	391	421	419	na	na	na	683	796	745	814	782	809	782	739	721	3051
Total teus	213257	240810	209591	227456	251281	na	na	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	1706929
Crane rate	15.4	15.9	18.0	18.7	20.1	na	na	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.3
Elapsed rate	16.4	17.8	19.4	20.7	23.1	na	na	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.6	21.5
Net rate	18.9	20.6	23.3	24.7	26.5	na	na	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.6	25.8

na Not available.

Notes 1. From September 1993 award shift breaks are excluded from the definition of net time which is used to calculate the net rate and the crane rate.
2. Indicators are for all quay crane operations on all types of ships calling at the container terminals.

Source WIRA, Patrick, Conaust and SeaLand.

AUSTRALIA

WATERLINE

MARCH 1996 ISSUE NO. 6

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This issue of *Waterline* includes the regular articles on stevedoring and port authority performance. Feature articles cover Australian coal ports and performance comparisons with Asian container ports.

As several commentators have recently expressed concern about the range of stevedoring indicators in Australia, the *Waterline* indicators are described in detail in this issue. These indicators provide comprehensive coverage in terms of the crane rate, the net rate, the elapsed rate, crane intensity and the proportion of time the ship is not worked. The general approach used in *Waterline* is consistent with the approaches of several other government agencies and industry bodies.

Dr Maurice Haddad
Director

IN BRIEF

Stevedoring performance

The five port average crane rate was 19.2 teus per hour in the December quarter 1995, down from 19.5 teus per hour in the previous quarter. The net rate declined to 25.3 teus per hour and the elapsed rate fell to 21.5 teus per hour.

Crane rates declined in Sydney (to 18.5 teus per hour), Melbourne (to 19.6 teus per hour) and Fremantle (to 19.2 teus per hour) in the December quarter. Net rates and elapsed rates were also down in these ports.

Crane rates increased in Brisbane (to 18.9 teus per hour) and Adelaide (to 21.4 teus per hour) in the December quarter. Adelaide's crane rate was the second highest rate in the port since the WIRA process. Net rates and elapsed rates were also up in Brisbane and Adelaide.

page two

Port authority performance

Total earnings before interest and tax of the five mainland capital city port authorities increased by 2 per cent to $197 million in 1994/95. Return on assets increased in three of the five ports and total dividends declined marginally to $50 million. The tonnage of cargo handled by the five ports increased by almost 3 per cent in January–June 1995 compared with the previous half year. Container traffic declined by 1 per cent to just over 1 million teus. Employment at the five port authorities fell by 10 per cent. Median turnaround time for container ships increased in three of the five ports in January-June 1995.

page seven

Australian coal ports

Around 137 million tonnes of coal were exported from Australia during 1994/95. Capital expenditure at Australia's nine coal terminals totalled $536 million over the five years to 1994/95. Since the late 1980s, there have been new operating and ownership arrangements, enterprise agreements, fewer trade unions and lower employee numbers at the terminals. Recent international comparisons indicate that waterfront charges for coal are relatively low in Australia, mainly as a result of low terminal charges.

page ten

Performance comparisons with Asia

The Bureau has undertaken international comparisons of waterfront performance involving four Australian ports and six Asian ports. Data provided by shipping lines indicate that the number of containers moved per working hour is substantially higher in the Asian ports. Ship-based charges are lower in Asia. There is significant variation in delay time, with the Asian ports having both the best and worst performance.

page thirteen

STEVEDORING PERFORMANCE INDICATORS

Waterline has traditionally reported three major indicators of stevedoring performance—the crane rate, the net rate and the elapsed rate (see definitions on page 18). It also provides information on crane intensity (the average number of cranes used to work each ship) and the proportion of elapsed time not worked.

The major indicators of stevedoring performance are prepared by dividing the number of teus exchanged by measures of ship time. Each indicator provides information about particular aspects of stevedoring performance.

Two of the indicators of stevedoring performance reported in *Waterline* are based on the time the ship is being worked, with non-working time resulting from such factors as award shift breaks and bad weather being excluded from the measure of time. The *crane rate* provides a measure of average crane productivity while the ship is being worked. The *net rate*, which is equivalent to the crane rate multiplied by average crane intensity, is a measure of the average rate at which containers (teus) are exchanged at the terminals. The net rate provides an indicator of overall terminal performance while the ship is being worked.

The third indicator of stevedoring performance reported in *Waterline* is the *elapsed rate*. This measure is based on the full time the ship is alongside the berth offering for work, whether it is worked or not. It is of particular interest to shipping lines since they are primarily interested in the total time taken to handle the ship's cargo. An average elapsed rate per crane can also be calculated from data on the elapsed rate and crane intensity, although there are potentially some methodological problems in dividing an elapsed time measure by a net time measure.

The difference between elapsed time and net time (see definitions on page 18) provides a measure of the time that a ship is available to be worked but lies idle. This indicator is regularly reported in *Waterline*. A decline in the average proportion of elapsed time not worked means that, on average, less time is being lost due to award shift breaks, factors associated with the ship's fault, bad weather, time awaiting cargo, industrial disputes, closure of facilities due to holidays, and/or shifts not worked at the ship operator's request.

The major indicators of stevedoring performance are prepared by dividing the number of teus exchanged by measures of ship time. Each indicator provides information about particular aspects of stevedoring performance.

Another indicator that is sometimes used in analysing stevedoring performance is the *gross rate*. This measure is based on gross time, which is the elapsed time minus non-working time attributable to all factors other than award shift breaks (that is, net time plus time unable to work the ship due to award shift breaks). The gross rate is not reported separately in *Waterline* as the elapsed rate incorporates the impact of all delays (including award shift breaks, industrial disputes and holidays) on the ship. By definition, the gross rate is always between the elapsed rate and the net rate for a particular set of container exchanges.

Figures 1 to 6 provide information on stevedoring performance over the period to the end of the December quarter 1995. Time series information on container terminal performance from the *Waterline* database is contained in table 6 (page 19).

The data in table 6 and figures 1 to 6 cover containers lifted on and off ships at major terminals in five Australian ports—Fisherman Islands (Brisbane), Port Botany (Sydney), Swanson Dock and Webb Dock (Melbourne), Outer Harbour (Adelaide) and North Quay (Fremantle). They do not include container movements at multi-purpose berths (for example, Darling Harbour) or across the ramps of roll-on/roll-off ships.

Five port average

Overall stevedoring performance at the five ports declined in the December quarter 1995, although two of the ports achieved improvements in performance.

In the December quarter there were work stoppages at all of the terminals in response to an industrial dispute involving CRA Ltd at Weipa. Local factors that affected one or more terminals during the period included congestion, civil works associated with terminal improvements, a shortage of space on northbound vessels, and changes in work arrangements following enterprise bargaining.

Crane rates fell in three ports and rose in two ports in the December quarter. The five port average crane rate was 19.2 teus per hour, down from 19.5 teus per hour in the September quarter (figure 1).

The five port average net rate declined to 25.3 teus per hour in the December quarter from 26.6 teus per hour in the previous quarter. Average crane intensity fell slightly to 1.33 from 1.37, with an increase in Brisbane being offset by declines in Sydney, Adelaide and Fremantle.

The five port average elapsed rate was 21.5 teus per hour in the December quarter, down from 22.6 teus per hour in the September quarter. On a per crane basis, the figure declined to 16.2 teus per hour from 16.5 teus per hour in the preceding quarter.

The five port average for the proportion of elapsed time not worked was 15.0 per cent in the December quarter, similar to the September quarter figure of 14.9 per cent. Increases in Brisbane, Melbourne and Fremantle were offset by declines in Sydney and Adelaide.

Brisbane

Stevedoring performance in Brisbane improved during the December quarter (figure 2).

The crane rate was 18.9 teus per hour, up from 18.5 teus per hour in the previous quarter. The December quarter crane rate was the highest rate in the port during 1995.

The net rate rose to 24.6 teus per hour in the December quarter from 22.8 teus per hour in the September quarter. This was the third consecutive increase in the net rate. The rise in the December quarter reflected the higher crane rate and an increase in average crane intensity to 1.30 from the previous quarter's figure of 1.24.

Brisbane's elapsed rate was 21.0 teus per hour in the December quarter, up from 20.1 teus per hour in the previous quarter. This was the third consecutive increase in the elapsed rate. On a per crane basis, the figure was 16.2 teus per hour for both quarters.

The average proportion of elapsed time not worked in Brisbane rose in the December quarter. The figure was 14.6 per cent compared with 11.9 per cent in the previous quarter.

Sydney

Sydney's stevedoring performance declined in the December quarter (figure 3).

The crane rate of 18.5 teus per hour was below the September quarter figure of 19.3 teus per hour.

Overall stevedoring performance at the five ports declined in the December quarter 1995. Performance declined in three ports and improved in two ports.

The net rate declined to 25.7 teus per hour in the December quarter from 29.9 teus per hour in the September quarter. This reflected a fall in average crane intensity to 1.41 from the previous quarter's figure of 1.56 and a reduction in the crane rate (that is, both the average number of cranes and the productivity of each crane declined).

Sydney's elapsed rate was 21.8 teus per hour in the December quarter, down from the previous quarter's figure of 23.4 teus per hour. On a per crane basis, the figure rose to 15.5 teus per hour from 15.0 teus per hour in the September quarter.

The average proportion of elapsed time not worked was 15.2 per cent in the December quarter, down from the previous quarter's figure of 21.6 per cent.

Melbourne

In Melbourne, there was a decline in stevedoring performance in the December quarter (figure 4).

The crane rate fell slightly to 19.6 teus per hour from 19.8 teus per hour in the previous quarter. This offset the increase that had occurred in the September quarter.

The net rate also fell slightly, to 26.4 teus per hour from 26.6 teus per hour in the preceding quarter, in response to the decline in the crane rate. Average crane intensity was unchanged at 1.35.

Melbourne's elapsed rate was 22.8 teus per hour in the December quarter, down from the previous figure of 24.1 teus per hour. On a per crane basis, the figure fell to 16.9 teus per hour from 17.9 teus per hour.

The average proportion of elapsed time not worked was 13.6 per cent in the December quarter, up from 9.4 per cent in the September quarter.

Adelaide

Adelaide's stevedoring performance improved during the December quarter (figure 5).

The crane rate increased to 21.4 teus per hour from 20.9 teus per hour in the September quarter. The December quarter figure was the second highest crane rate in the port since the WIRA process.

The net rate was 26.7 teus per hour in the December quarter, up from 26.5 teus per hour in the September quarter. This was the third consecutive increase in the net rate. Average crane intensity

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS

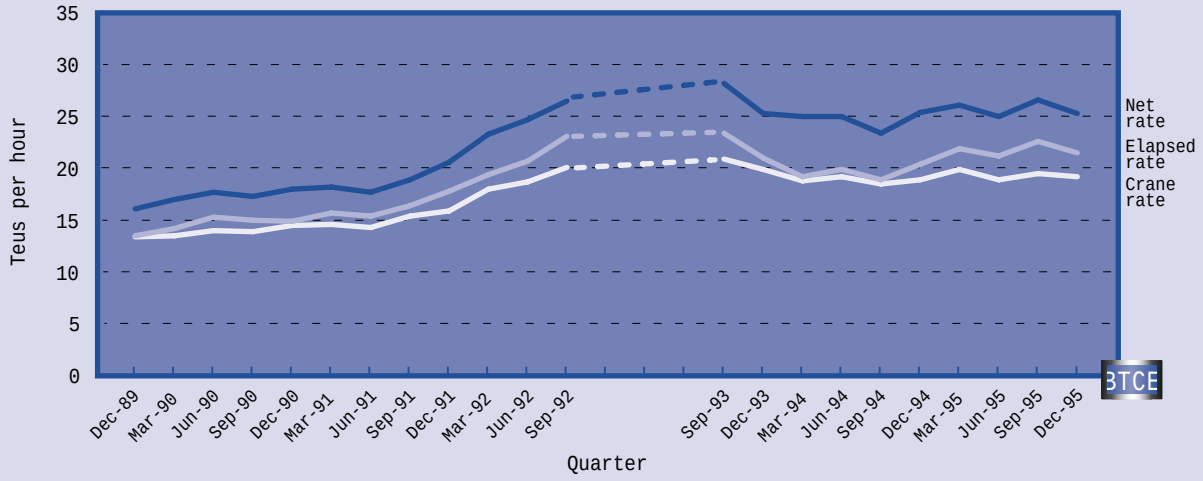


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS

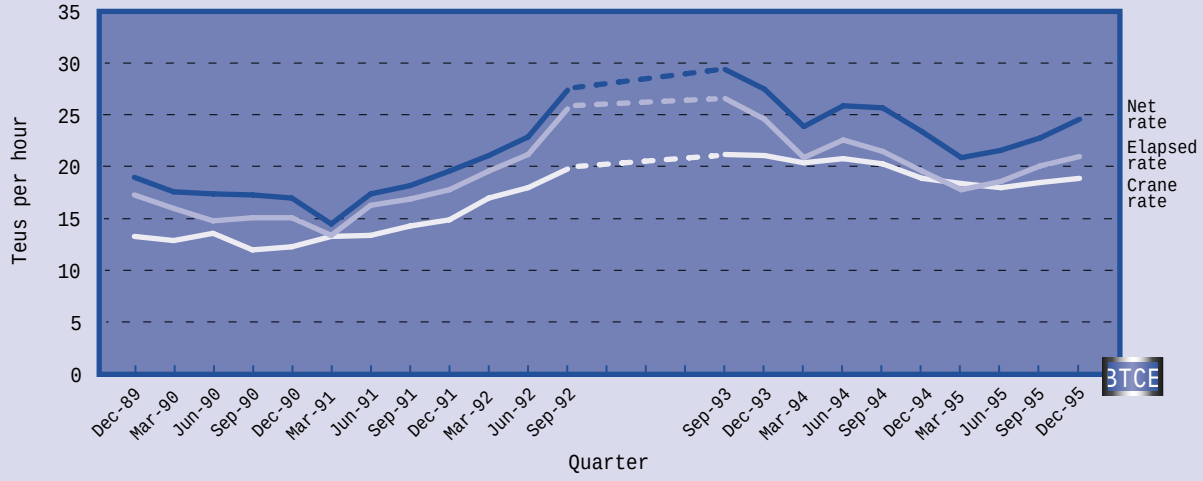
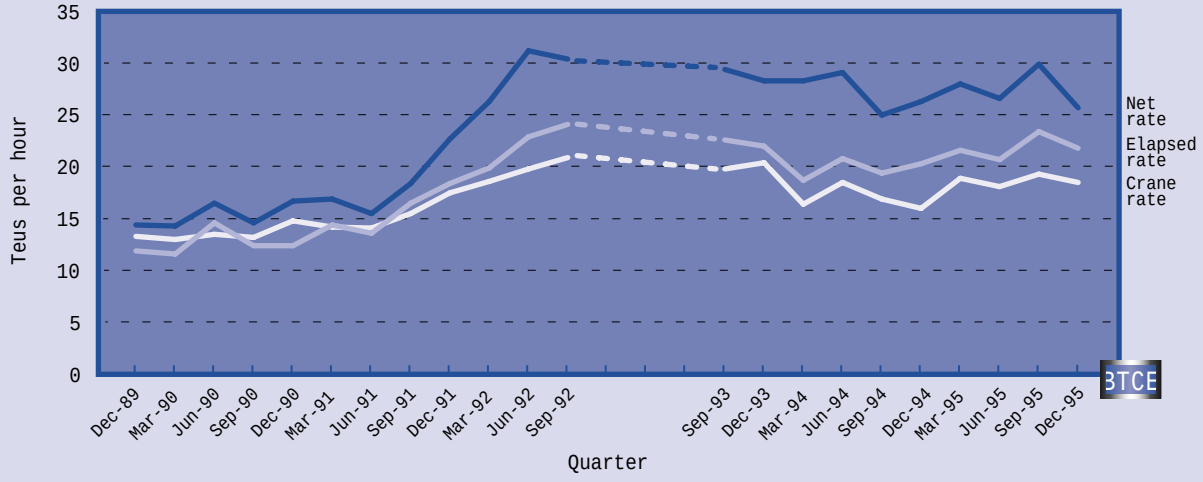


FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and the crane rate. Data unavailable for December 1992 to June 1993.*

Sources *WIRA, Patrick, Conaust and SeaLand.*

FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS

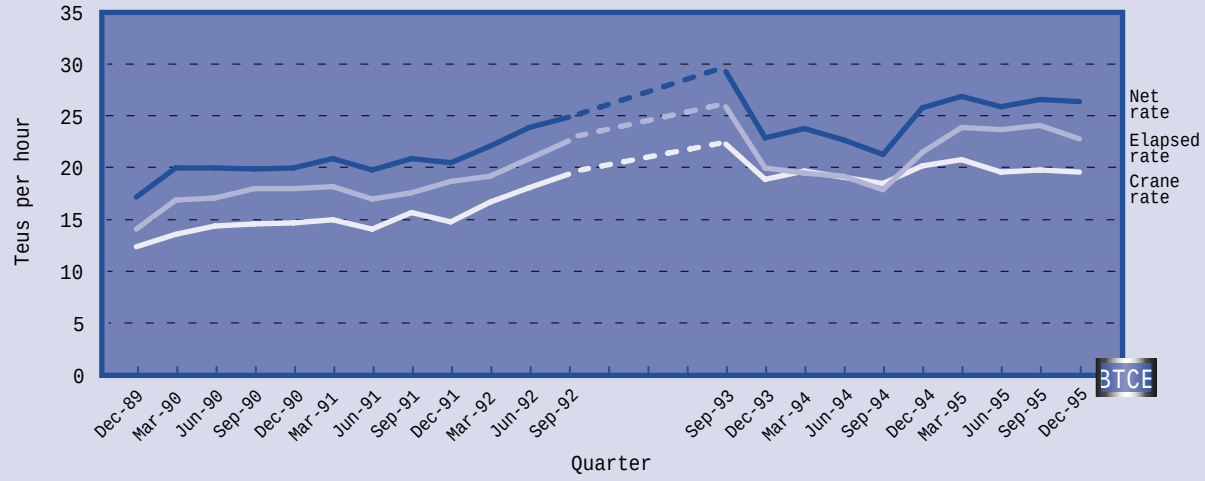


FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS

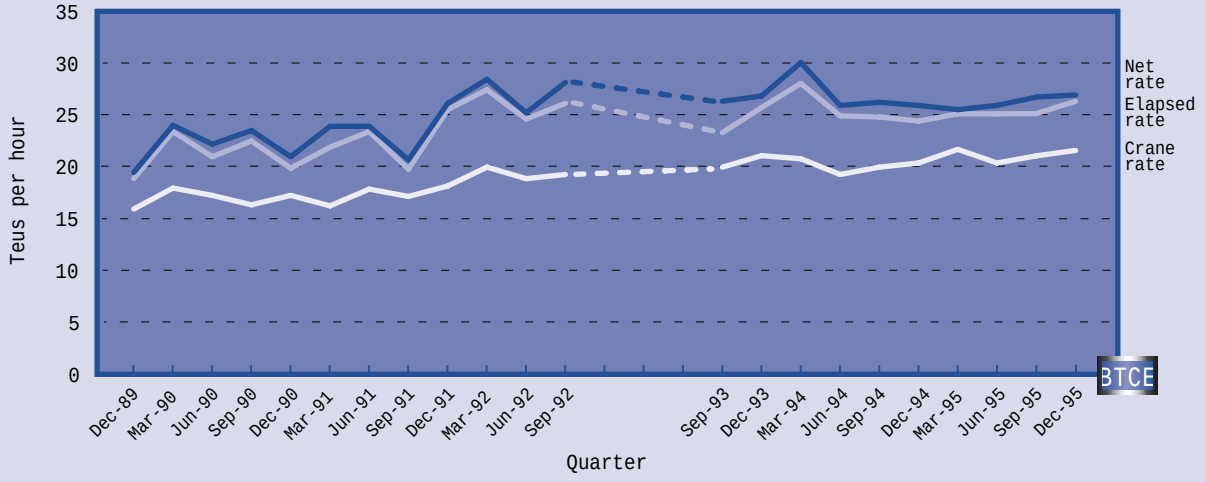
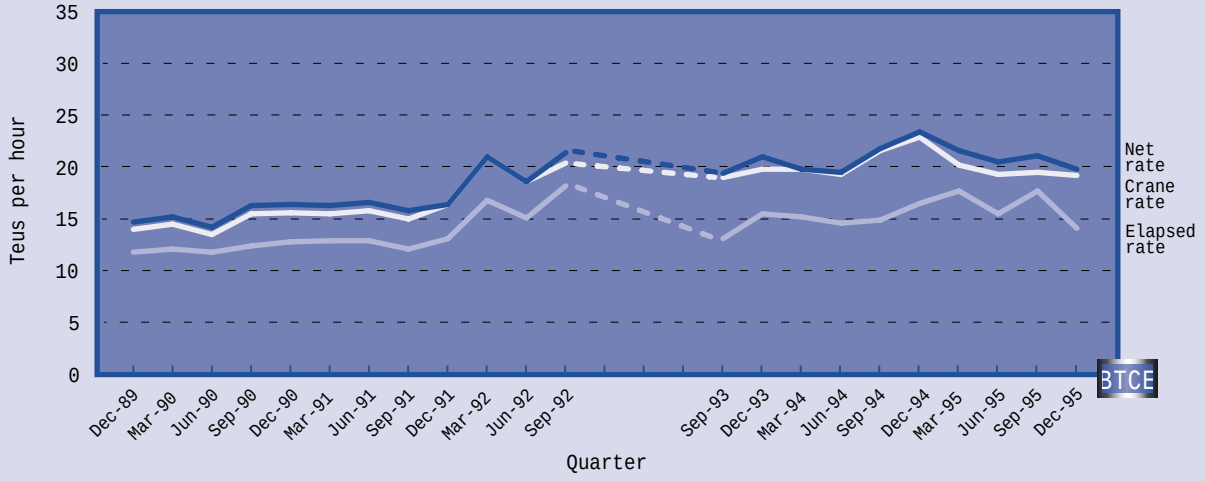


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *From September 1993, award shift breaks are excluded from the definition of net time which is used to calculate the net rate and the crane rate. Data unavailable for December 1992 to June 1993.*

Sources *WIRA, Patrick, Conaust and SeaLand.*

fell slightly to 1.25 from the previous quarter's figure of 1.27.

Adelaide's elapsed rate of 26.1 teus per hour was above the September quarter figure of 24.9 teus per hour. The December quarter figure was the second highest elapsed rate for the port since the end of the WIRA process. On a per crane basis, the figure rose to 20.9 teus per hour from 19.6 teus per hour in the previous quarter.

Adelaide continued to have a very low proportion of time not worked. The average proportion of elapsed time not worked was 2.2 per cent in the December quarter, down from the previous level of 6.0 per cent.

Fremantle

Stevedoring performance in Fremantle declined in the December quarter (figure 6).

The crane rate fell to 19.2 teus per hour from 19.5 teus per hour in the previous quarter.

The net rate was 19.8 teus per hour in the December quarter, down from 21.1 teus per hour in the September quarter. This reflected the decline in the crane rate and a fall in average crane intensity to 1.03 from the previous quarter's figure of 1.09.

Fremantle's elapsed rate declined to 14.1 teus per hour in the December quarter from 17.7 teus per hour in the September quarter. On a per crane basis, the figure fell to 13.7 teus per hour from 16.2 teus per hour.

The relatively large fall in the elapsed rate, compared with the fall in the net rate, reflected an increase in the proportion of time not worked. The average proportion of elapsed time not worked rose to 28.8 per cent in the December quarter, compared with 16.3 per cent in the September quarter.

Reliability

The major indicators of stevedoring performance reported in *Waterline* measure aspects of productivity. However, commentators on waterfront performance have often focused on the issue of reliability. A lack of industry-wide data has made it difficult to adequately monitor waterfront reliability.

Information on industrial disputes provides a measure of one of the factors affecting waterfront reliability. For the 10 years to 1995, there was initially a reduction in working days lost. A significant increase in 1994 was partly offset by a susequent decline in 1995.

Some data on industrial disputes in stevedoring are available. This information provides a measure of one of the factors affecting waterfront reliability in Australia. In general, industrial disputes of short duration do not have a significant effect on the productivity indicators reported in *Waterline*.

Figure 7 indicates that the number of working days lost from industrial disputes at stevedoring establishments has been variable on an annual basis. There was a reduction in time

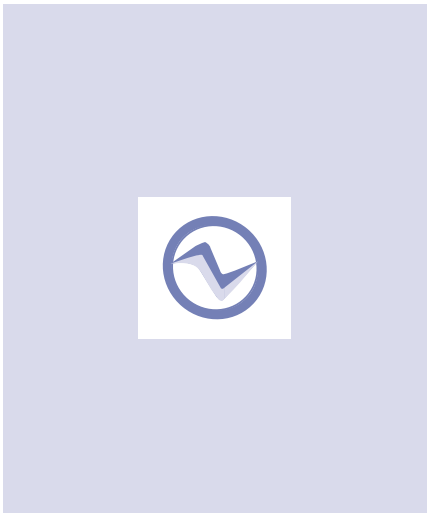
FIGURE 7 WORKING DAYS LOST DUE TO INDUSTRIAL DISPUTES AT AUSTRALIAN STEVEDORING ESTABLISHMENTS, 1986 TO 1995

Source *ABS unpublished data from the industrial disputes collection.*

lost over the early part of the period covered by figure 7. A significant increase in 1994 was partly offset by a subsequent decline in 1995.

Figure 7 covers industrial disputes where employees were on strike (including unauthorised stop-work meetings). It does not cover work-to-rules, work bans or go-slows. Figure 7 is also affected to some extent by the decline over time in the number of employees at stevedoring establishments. Closure of a particular facility for a certain period will result in less working days lost when there are fewer employees.

The data on stevedoring disputes provide only a very broad indicator of the impact of industrial disputes. The impact will vary in response to factors such as the length of each dispute, the amount of notice to shipping lines and shippers, and the number of ships in port or scheduled to arrive during the dispute. The effects of disputes in other areas of the waterfront (for example, towage) are not captured by the stevedoring data in figure 7. In addition, factors other than industrial disputes (for example, congestion and equipment breakdowns) will affect waterfront reliability.



PORT AUTHORITY PERFORMANCE

Information on the performance of the five mainland capital city port authorities is presented in table 1 (financial indicators for 1993/94 and 1994/95) and table 2 (non-financial indicators for six-month periods in 1994/95).

The port authorities in Brisbane and Adelaide were corporatised during 1994/95. The Sydney Ports Authority was corporatised after this period (on 1 July 1995).

Financial indicators

There was significant variation in port authority financial performance in 1994/95.

Total earnings before interest and tax (EBIT) of the five port authorities increased by 2.2 per cent to $196.9 million in 1994/95. EBIT rose in Sydney,

TABLE 1 FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1993/94 & 1994/95

	Brisbane		Sydney		Melbourne		Adelaide[e]		Fremantle	
Indicator	1993/94	1994/95	1993/94	1994/95	1993/94	1994/95	1993/94	1994/95	1993/94	1994/95
				per cent						
Return on assets[a]	17.7	7.9	15.7	18.2	13.9	15.9	9.0	4.1[f]	14.3	15.1
Dividend payout ratio[b]	16.6	33.0	62.3	51.4	25.8	32.9	50.0	-702.7[f]	0.0	0.0
Debt/equity[c]	0.0	0.0	26.0	28.3	155.1	117.0	79.8	80.3	g	g
				$ million						
EBIT[d]	35.8	29.0	53.2	62.3	71.6	83.6	19.5	8.1[f]	12.6	13.9
Average total assets in service	202.1	368.8	339.7	341.6	514.4	525.0	217.9	195.7	88.4	91.9
Dividends paid	6.0	9.6	28.8	21.1	11.0	12.0	4.7	7.5	0.0	0.0
Operating profit[d]	35.8	29.0	46.2	41.1	42.7	36.4	9.3	-1.1[f]	5.3	7.2
Total debt	0.0	0.0	50.6	60.7	266.7	236.9	94.2	85.4	82.6[r]	76.1
Total equity	194.7	353.5	194.3	214.3	172.0	202.5	118.0	106.3	-27.7	-19.9

r revised figure.

a. EBIT as a proportion of total assets. EBIT is earnings before interest and tax.

b. Dividends paid out as a proportion of operating profit.

c. Total debt as a proportion of total equity.

d. Includes abnormals.

e. 1993/94 data cover commercial operations of Department of Marine & Harbors. 1994/95 data are a consolidation of the SA Ports Corporation and the Department of Marine & Harbors.

f. Industry Commission definitions used in Waterline include abnormal items. 1994/95 figures for Adelaide include abnormals of $13.5 million which relate to assets not transferred to the SA Ports Corporation in the transition from the Department of Marine and Harbors.

g. Calculation of debt/equity is not appropriate as the Port of Fremantle Authority has negative equity in terms of the definitions used in Waterline.

Note Accounts are based on historic costs.

Source AAPMA.

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Melbourne and Fremantle as a result of increased trade and cost reductions. The decline in Brisbane primarily reflected higher depreciation charges following a major revaluation of the assets acquired by the Port of Brisbane Corporation on 1 July 1994. The lower EBIT for Adelaide's port authority was attributable to abnormal items associated with major changes to the balance sheet as a result of the corporatisation process.

Operating profit after income tax declined in all ports except Fremantle in 1994/95. In the case of Brisbane and Adelaide, the reduction reflected the factors affecting EBIT.

Operating profit after income tax fell in Melbourne and Sydney as the port authorities became subject to State Government income tax equivalent regimes from 1 July 1994. These regimes require government trading enterprises to pay to the State Government's Consolidated Fund amounts equivalent to those that would be payable if the enterprises were subject to the Commonwealth Income Tax Assessment Act. The two port authorities incurred a total income tax equivalent expense of $35.3 million in 1994/95.

Total earnings before interest and tax of the five port authorities increased to $196.9 million in 1994/95. Return on assets increased in three ports and declined in two ports.

Return on assets increased in Sydney, Melbourne and Fremantle in 1994/95 in response to higher EBIT and only small rises in total assets. There was a significant decline in return on assets in Brisbane, reflecting both the revaluation of the port authority's assets and the associated increase in depreciation charges which in turn reduced EBIT. The lower return on assets for Adelaide's port authority resulted from the fall in EBIT which more than offset the reduction in assets that occurred as part of the corporatisation process.

Total dividends paid by the five port authorities declined marginally in 1994/95 to $50.2 million, with a reduction in Sydney offsetting increases in Brisbane, Melbourne and Adelaide. The Port of Fremantle Authority did not pay a formal dividend in either 1993/94 or 1994/95 in view of its reliance on debt capital. Adelaide's port authority was required to pay a dividend of $7.5 million despite incurring an operating loss.

Total debt of the port authorities was reduced by 7.1 per cent to $459.1 million in 1994/95. Debt reductions for the port authorities in Melbourne, Adelaide and Fremantle were partly offset by increased debt reported for Sydney's port authority. Brisbane remained debt-free in 1994/95.

TABLE 2 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1994/95

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five Ports	
Indicator	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun
Turnaround time[a]												
Median result (hrs)	29.2	30.7	53.4	48.2	47.0	39.2	24.2	28.0	29.5	29.7	-	-
95th percentile (hrs)	61.1	60.7	129.3	92.2	118.3	81.8	62.2	58.0	84.5	86.3	-	-
Average total employment	225	226	329	233	407	392	289	254	229	223	1479	1328
Total port throughput ('000 tonnes)	9333	9248	10577	10272	7608	8118	2380	2211	9600	10729	39498[r]	40578
Non-containerised general cargo ('000 tonnes)[b]	312	262	554	539	930	941	174	153	249	316	2219	2211
Containerised cargo (teus exchanged)												
Full import	40707	39009	181883	166140	204130	187394	9236	9617	37733	43546	473689[r]	445706
Empty import	19008	16850	7866	6910	27737	29431	6044	5856	9141	9466	69796	68513
Full export	47927	50650	107044	97353	175544	176400	15932	16889	34544	39389	380991	380681
Empty export	7330	11212	44051	55339	37834	41681	1399	1552	6970	8483	97584[r]	118267
Total teus	114972	117721	340844	325742	445245	434906	32611	33914	88388	100884	1022060[r]	1013167

- not applicable.

r revised figure.

a. Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.

b. Excludes bulk cargoes.

Source AAPMA.

Total equity of the five port authorities increased by 31.5 per cent to $856.7 million in 1994/95. This reflected higher equity at four port authorities, with a major factor being a large increase at Brisbane following the revaluation of the port authority's assets. The decline in Adelaide was associated with the restructuring of the port authority.

The debt/equity ratio fell significantly in Melbourne in 1994/95. It rose slightly in Sydney and Adelaide.

Non-financial indicators

Table 2 indicates that the total tonnage of cargo handled by the five ports increased by 2.7 per cent in January–June 1995 compared with the July–December 1994 period. Total tonnage was 3.5 per cent higher than for the corresponding half-year in 1993/94. The increase in the second half of 1994/95 reflected higher throughput in Fremantle and Melbourne, with the other ports being adversely affected by factors such as the drought.

Total container traffic at the five ports declined by 0.9 per cent in January–June 1995. In the full year 1994/95 a total of 2.0 million teus were exchanged at the five ports, a 9.9 per cent increase on the 1993/94 figure.

The tonnage of non-containerised, general cargo handled at the five ports declined marginally in the second half of 1994/95. Increases in traffic through Melbourne and Fremantle were more than offset by declines at the other ports.

Compared with the July–December 1994 period, total container traffic at the five ports declined by 0.9 per cent in January–June 1995. The main changes were a 5.9 per cent fall in full import teus and a rise of 21.2 per cent in empty export teus. The total number of teus increased at Fremantle (14.1 per cent), Adelaide (4.0 per cent) and Brisbane (2.4 per cent). There were declines at Sydney (4.4 per cent) and Melbourne (2.3 per cent), but these two ports still handled three-quarters of the containers exchanged at the five ports in January–June 1995. In the full year 1994/95 a total of 2.0 million teus were exchanged at the five ports, a 9.9 per cent increase on the 1993/94 figure.

Total employment at the five port authorities in January–June 1995 was 30 per cent below the figure for July–December 1993. This reduction illustrates the significant restructuring of port authority work forces that has occurred over the period.

The data in table 2 cover all containers handled at the five ports. They include movements at all terminals and multi-purpose berths, whether by lifting or by movement across the ramps of roll-on/roll-off ships. Table 2 therefore provides a more comprehensive measure of container traffic than table 6 which only includes containers lifted on and off cellular ships at major container terminals in the five ports.

Table 2 indicates that total employment at the five port authorities declined by 151 (10.2 per cent) in January–June 1995 compared with the previous half-year. There were falls in most of the ports, with the decrease in Sydney being the largest. The five-port figure for January–June 1995 is 30 per cent below the figure for July–December 1993 reported in the first issue of *Waterline*. This reduction illustrates the significant restructuring of port authority work forces that has occurred since 1993.

In January–June 1995, the median turnaround time for container ships increased in three ports and declined in two ports compared with the previous half-year. This indicator is based on total time in port (usually measured from port boundary to port boundary). It is not directly comparable with the estimated stevedoring time for a 560 teu exchange (based on time between labour first ordered and last labour off the ship) that has also been reported in previous issues of *Waterline*.

The 95th percentile turnaround time fell in four ports and rose in the remaining port in the January–June period. There were large declines in the 95th percentile figures for Melbourne and Sydney.

AUSTRALIAN COAL PORTS

In 1994/95, 137 million tonnes of steaming coal and coking coal, valued at $6.9 billion, were exported through Australian ports (ABS 1995). The major destinations were Japan, the Republic of Korea, Taiwan, India, the United Kingdom, the Netherlands and Hong Kong. Australia is the world's largest coal exporter, accounting for 32 per cent of world coal exports on a tonnage basis (ABARE 1995).

Ports

The movement of export coal involves an integrated transport system linking the mines with the loading facilities at the ports. Most of the coal for export from Australia is transported to the ports by rail. Road transport is also used on a significant scale, particularly in New South Wales. There is limited use of barge transport (from the West Moreton area to Brisbane) and coastal shipping (from the Lake Macquarie area to Newcastle).

Ships are loaded with export coal at six ports in New South Wales and Queensland. Newcastle, Gladstone, Port Kembla and Brisbane are multi-purpose ports which handle a range of cargoes including coal. Hay Point (near Mackay) and Abbot Point (near Bowen) are specialist coal ports. In terms of the annual tonnage handled, Newcastle and Hay Point are amongst the largest coal ports in the world.

Coal exports increased by almost 24 per cent between 1990/91 and 1994/95 with strong growth in shipments through Newcastle, Hay Point and Gladstone.

Data on the volume of coal shipments through the six ports between 1990/91 and 1994/95 are presented in table 3. Coal exports increased by almost 24 per cent over this period with strong growth in shipments through Newcastle, Hay Point and Gladstone. These increases reflected both expansion of output at existing mines and the opening of some new mines in the areas serviced by these ports.

Exports through the other ports did not increase significantly over the period to 1994/95. In the case of Brisbane, this reflected a lack of capital investment at the mines serviced by the port, mine closures and growing domestic demand. Abbot Point shipments were limited by mine output as the port has rail connections to only two mines. Exports through Port Kembla were affected by the financial difficulties of one mine operator and geological problems at several mines during the period.

The main port facilities used to handle coal exports are the terminals, the associated berths, and ship services such as towage and pilotage. The available data indicate that terminal charges account for between 39 per cent and 86 per cent of coal waterfront charges at Australian ports (BIE 1995, 176). The remaining sections of this article focus on the coal terminals.

Coal terminals

A coal terminal incorporates facilities for the receival of coal from the mines, stockpiling, reclaiming and ship loading. Each terminal typically receives coal from a number of sources, ranging from two mines for the Abbot Point Coal Terminal to as many as 15 mines for the R. G. Tanna Coal Terminal in Gladstone.

Australia's coal export ports incorporate a total of nine coal terminals. Information on these terminals is contained in table 4. In three of the ports there are two terminals, with one operator for both terminals in Newcastle and separate operators for the terminals at Hay Point and at

TABLE 3 AUSTRALIAN COAL EXPORTS BY MAJOR PORT, 1990/91 TO 1994/95

	Volume (m tonnes)					Value ($m)
Port	1990/91	1991/92	1992/93	1993/94	1994/95	1994/95
Newcastle	36.6	37.9	42.4	44.2	47.7	2 220
Hay Point	35.8	40.5	42.8	44.0	46.7	2 491
Gladstone	18.2	19.6	19.9	20.0	23.3	1 242
Port Kembla	12.0	15.2	15.0	13.2	11.2	579
Abbot Point	5.4	5.9	5.9	4.8	5.2	233
Brisbane	2.7	3.5	2.8	2.8	2.8	134
Total	110.7	122.6	128.8	129.0	136.9	6 899

Sources *Terminal operators, port authorities, ABS (1995).*

Gladstone. The remaining ports each have one coal terminal.

There is significant variation in terminal ownership and operating arrangements. The terminal owner is also the operator at Newcastle, Brisbane and the R. G. Tanna Coal Terminal (Gladstone). In the case of the Hay Point and Barney Point (Gladstone) terminals, the terminal operator is an affiliate of one of the terminal owners. The Dalrymple Bay and Abbot Point terminals are owned by the Ports Corporation of Queensland but operated by private companies. At Port Kembla, the terminal is leased from the Port Kembla Port Corporation by the operator.

Most of the terminal operators are private companies which are wholly or partly owned by mine operators. The exception is Gladstone, where the operator of the R. G. Tanna Coal Terminal is the port authority.

Capacity and operational changes

Data provided by terminal owners and operators indicate that capital expenditure at Australia's coal terminals totalled $536 million over the five years to 1994/95. Work included the construction of additional berths, unloading stations, stockpile capacity, stacking equipment, reclaimers, conveyors and shiploaders. There were also some improvements to operating systems and environmental management.

This capital expenditure resulted in a substantial expansion of Australia's coal terminal capacity, which rose from 147.6 million tonnes per annum in June 1991 to 174.5 million tonnes per annum in June 1995. Major projects were undertaken at Newcastle (from 46 million tonnes to 56 million tonnes),

TABLE 4 COAL TERMINALS AT AUSTRALIAN PORTS, 1996

Port/terminal	Owner of terminal	Owner of terminal operator	Max ship size[a] (dwt)	Max ship loading rate (tonnes/hr)	Annual capacity (tonnes)	Number of berths	Ship calls 1994/95
Newcastle							
Kooragang Coal Terminal	Port Waratah Coal Services Ltd	Mine operators & customers	232 000	10 500	58.0 million[b]	2	264
Port Waratah Coal Terminal	Port Waratah Coal Services Ltd	Mine operators & customers	180 000	5 000		2	371
Hay Point							
Dalrymple Bay Coal Terminal	Ports Corporation of Queensland	5 mine operators	200 000	6 600	26.5 million	2	306
Hay Point Coal Terminal	Central Queensland Coal Associates	Mine operator	200 000	6 000	25.0 million	2	312
Gladstone							
R G Tanna Coal Terminal	Gladstone Port Authority	Port authority	220 000	8 000	30.0 million	2	255
Barney Point Coal Terminal	BHP-Mitsui Coal Pty Ltd	Mine operator	90 000[c]	2 000	5.0 million	1	37
Port Kembla							
Port Kembla Coal Terminal	Port Kembla Port Corporation[d]	6 mine operators	140 000	6 600	16.0 million	2	186
Abbot Point							
Abbot Point Coal Terminal	Ports Corporation of Queensland	Mine operator	200 000	4 600	12.0 million	1	75
Brisbane							
Fisherman Islands Coal Terminal	Queensland Bulk Handling Pty Ltd	Mine operator & specialised transport company	90 000	3 000	4.0 million	1	89

a. Maximum ship size is approximate and may be affected by ship characteristics other than dwt. For example, the constraining factor is ship's beam at Dalrymple Bay and ship length at Port Kembla.

b. Combined capacity of both terminals at Newcastle. Includes additional capacity of 2.0 million tonnes since 1994/95.

c. Ships up to 150 000 dwt can be handled at Barney Point if they are part loaded and the balance of cargo is loaded at another Australian terminal.

d. Port Kembla Coal Terminal Ltd has a 20 year operating lease on the coal terminal site and plant and equipment from 13 August 1990, with an option to renew for a further 20 year term.

Sources Terminal owners and operators, AAPMA.

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Gladstone's R. G. Tanna Coal Terminal (from 21 million tonnes to 30 million tonnes), and Dalrymple Bay (from 18.6 million tonnes to 26.5 million tonnes). Some older facilities were closed, with Newcastle's Basin coal loader ceasing operations in 1988 and Sydney's Balmain coal loader closing in 1991.

Capital expenditure of $536 million over the five years to 1994/95 increased Australia's annual coal terminal capacity by 27 million tonnes. Current expenditure commitments total $212 million.

Several terminal owners are undertaking further projects to expand capacity. Current expenditure commitments include $162 million for the Dalrymple Bay Coal Terminal and $50 million for the Hay Point Coal Terminal. These projects will increase annual capacity by a further 13.5 million tonnes. Additional capacity expansion can be undertaken at several other terminals when required by shippers and overseas customers.

Since the late 1980s, there have been changes to operating and ownership arrangements at several terminals. The Port Kembla Coal Terminal was managed by the Maritime Services Board until 1990 when a consortium of six mine operators took over the terminal lease. The two terminal operators in Newcastle merged to form a single operator in 1990, with the process including the sale of a 20 per cent holding in one of the terminals by the Maritime Services Board. The Ports Corporation of Queensland (owner of the Dalrymple Bay and Abbot Point terminals) and the Gladstone Port Authority (owner of the R.G. Tanna Coal Terminal) were corporatised in 1994.

Enterprise agreements have been introduced at the coal terminals, with several terminals now operating under their second agreements. The benefits have included multi-skilling and improved career paths for staff, fewer demarcation disputes and increased efficiency.

The number of trade unions at individual terminals has generally declined since the late 1980s. This process has included the withdrawal of particular unions from several terminals. The largest decline occurred at Port Kembla, with a fall from 13 to three trade unions.

The number of trade unions at the coal terminals has generally declined since the late 1980s. There is significant variation in the current number of unions at individual terminals.

There is significant variation in the number of trade unions at individual coal terminals and in the unions with the most members at each terminal. Arrangements for individual terminal operators include one union, two unions, four unions, five unions and seven unions. There are three operators with three unions. The unions with members at the coal terminals, and the number of terminal operators where each union has members, are:

- Construction, Forestry, Mining and Energy Union (CFMEU)—eight operators;
- Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union (CEPU)—six operators;
- Australian Workers Union and Federation of Industrial, Manufacturing and Engineering Employees (AWU–FIMEE)—four operators;
- Australian Manufacturing Workers Union (AMWU)—six operators;
- Australian Services Union (ASU)—two operators;
- Transport Workers Union (TWU)—one operator; and
- Maritime Union of Australia (MUA)—one operator.

The arrangements at the coal terminals contrast with the situation at the container terminals where operational employees are covered by the MUA.

Performance

The available data indicate that Australian coal terminal charges varied between $1.80 per tonne and $4.50 per tonne in 1995 (BIE 1995, 176). The differences between terminals reflect a range of factors including variations in throughput (which affects access to economies of scale), capital charges (ownership or lease arrangements), location (urban or greenfields sites) and financial arrangements (profit centres or cost centres).

As noted earlier, there have been significant increases in capacity and throughput at several coal terminals since 1990/91. Higher loading rates and faster ship turnaround times have also been achieved at various terminals, including some of the facilities where throughput has been stable.

The available data indicate that increased throughput at Australia's coal terminals has

been accompanied by a significant reduction in overall employee numbers. Between 1991 and 1996, the number of employees at the nine coal terminals fell by around 17 per cent, from 1380 to 1140. Employment at most terminals declined marginally or was steady, with a large proportion of the reduction in overall numbers being attributable to a fall at Port Kembla from 400 to 188. The 29.9 per cent rise in throughput at Newcastle, Hay Point and Gladstone between 1990/91 and 1994/95 was achieved with a slight reduction in the number of coal terminal employees at these ports.

Increased throughput at Australia's coal terminals has been accompanied by a reduction in overall employee numbers of around 17 per cent since 1991.

In 1995, the Bureau of Industry Economics (BIE) published the results of a benchmarking study of 10 coal ports covering Australia (five), North America (three), South Africa (one) and Indonesia (one) (BIE 1995). It concluded that waterfront charges for coal were generally lower in Australia than in North America and South Africa, mainly as a result of relatively low coal terminal charges in Australia. Labour productivity and capital utilisation at the Australian coal terminals were high. The BIE noted that this good performance appeared to be partly a result of the highly mechanised nature of bulk terminals. The close relationship between exporters, terminal operators and port authorities was also a factor.

INTERNATIONAL COMPARISONS—ASIA

Issue 5 of *Waterline* contained the results of the Bureau's initial work on international comparisons of waterfront performance, covering several ports in Australia and New Zealand. There are difficulties with drawing firm conclusions about relative efficiency from international comparisons, since performance is affected by local conditions beyond industry control such as geography and the adequacy of land-based infrastructure. In addition, the results reflect only the performance of the specific ports and terminals included in the comparisons. However, international comparisons of this kind do provide an indication of the relative performance of Australia's waterfront.

In terms of the number of containers moved per working hour, the Asian terminals included in the Bureau's study have much higher productivity than the Australian terminals. A range of factors contribute to these inter-port variations.

The second part of the Bureau's work on international comparisons focuses on stevedoring performance in selected Asian and Australian ports. As a region, Asia accounts for more than one-half of Australia's merchandise exports. It has a high rate of economic growth, with traffic through many Asian ports increasing rapidly. There is strong competition between various ports in the region, particularly to attract hub traffic. Factors such as congestion and infrastructure shortages adversely affect landside efficiency and port operations in many Asian countries.

The Bureau's analysis is based on information for eight lines operating ships between Australia and Asia during 1995. The data cover four Australian ports and six Asian ports, with the number of ship calls at individual ports ranging from 22 to 95.

The results of the Bureau's analysis are summarised in table 5. In order to maintain commercial confidentiality, ports are grouped on a trade basis with at least two respondents for each port. Stevedoring performance or ship-based charges at individual Australian ports in different groups (for example, Sydney in the first group and Fremantle in the fifth group) are not directly comparable as each group reflects different ship and trade characteristics.

Since the data in table 5 are based on the experiences of individual shipping lines, they are affected by factors such as the characteristics of the lines' ships (which include some roll-on/roll-off vessels). Therefore, the figures do not represent overall port averages. However, as the data provided by each shipping line are consistent across all ports in their groups, table 5 provides valid comparative measures of performance.

Stevedoring productivity

The number of containers moved per working hour is an indicator of stevedoring productivity. In table 5, working time is defined as the period between the commencement and completion of stevedoring work (that is, labour aboard to labour ashore). It is similar to the elapsed rate regularly reported in *Waterline*.

This indicator is of particular interest to shipping lines. It reflects a range of factors

TABLE 5 PERFORMANCE COMPARISONS FOR SELECTED AUSTRALIAN AND ASIAN CONTAINER PORTS

Port group	Port calls	Containers exchanged/call	Moves per working hour	Delay time[a]	Moves per port hour	Index of ship based charges
Sydney	39	556	13	11	10	100
Melbourne	48	458	13	8	10	152[b]
Singapore	38	663	42	2	37	31
Sydney	37	448	12	7	10	100
Melbourne	47	382	13	4	11	na
Brisbane	22	348	13	5	11	na
Jakarta	31	439	18	50	6	24
Singapore	36	421	35	3	27	28
Sydney	84	659	14	10	12	100
Melbourne	80	892	20	9	16	138
Brisbane	95	550	12	6	11	77
Yokohama	82	633	47	6	32	77
Osaka	80	416	32	4	24	70
Sydney	71	668	15	10	12	100
Melbourne	70	826	18	10	15	173[b]
Hong Kong	43	1 045	45	5	37	34
Keelung	42	738	24	13	17	46
Fremantle	83	290	12[c]	9	9[c]	100
Singapore	78	531	41	2	37	38

na not available.

a. Delay time is the difference between total berth time plus time waiting to berth, and the time between start and finish of ship working.

b. High relative charges in Melbourne reflect differences in port charging regimes and the characteristics of the ships operated by one of the lines which provided data.

c. Productivity in Fremantle relative to Singapore is partly affected by lower annual terminal throughput and a lower average exchange per port call in Fremantle.

Note All figures are averages with the exception of port calls which are total calls for all companies reporting for the port grouping.

Source Data provided by shipping lines.

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including the crane rate, crane intensity and work delays. The figures in table 5 are based on the number of containers moved per hour and are not directly comparable with the regular *Waterline* data which are based on the number of teus moved per hour.

Table 5 shows that, in terms of the number of containers moved per working hour, the Asian terminals have much higher productivity than the Australian terminals. Data provided by individual lines indicate that terminals at Pusan (Republic of Korea) and Port Kelang (Malaysia) also have significantly higher productivity than terminals at Australian ports.

As noted in issue 5 of *Waterline*, a range of factors contribute to inter-port variations in stevedoring productivity. Table 5 controls for differences in ship characteristics and some aspects of cargo characteristics, since the data provided by each shipping line are based on a particular group of ships in a certain trade.

Other things being equal, a higher average container exchange will facilitate a higher handling rate. The data in table 5 indicate that, with the exception of Singapore in the Fremantle–Singapore group and Hong Kong, average exchanges are not significantly higher in the Asian ports included in the comparisons. This suggests that differences in average container exchanges are not the source of the general variation in handling rates between the Australian and Asian terminals indicated by table 5.

Factors that contribute to the reported variations in handling rates between the Australian and Asian terminals include differences in work practices and terminal equipment. Economies of scale resulting from the higher annual throughputs at most of the Asian ports included in the comparisons are a significant factor. In particular, several lines which provided data for the comparisons identified the availability of cranes as a major contributor to the higher handling rates at the Asian

terminals. Limited information provided by some lines indicated that, relative to the Australian terminals, average crane intensity for their ships was 50 to 100 per cent higher at many Asian terminals.

Several lines also stated that average crane rates (the number of containers moved per crane per hour) at the Asian terminals were considerably higher than crane rates at the Australian terminals. As most respondents did not provide comprehensive data on crane intensity, it was not possible to include crane rates in Table 5. However, the limited information available suggests that, for individual trades, average crane rates at the Asian terminals included in table 5 are between 33 per cent and 183 per cent higher than crane rates at the Australian terminals.

The shipping lines also identified various other factors that contribute to higher productivity at the Asian terminals. One line reported that Australian terminal operators have only recently commenced closing off receivals in time to allow pre-planning of the loading sequence and pre-stacking of containers prior to loading. By comparison, this practice has reportedly been implemented for some time in the Asian ports and significantly improves their productivity. Another line commented that some ships work in the 'stream' at Hong Kong where six to eight crane barges can operate simultaneously. Several lines stated that the common practice of loading and discharging at multiple ports in Australia contributes to lower productivity at some of these ports as it involves cargo layouts which are more difficult to work.

The data in table 5 indicate that there is significant scope to increase the number of moves per working hour at Australian container terminals. However, the specific productivity levels at the Asian terminals are not necessarily achievable in Australia since the differences in productivity partly reflect factors that are beyond the control of Australian terminal operators. In particular, higher annual throughputs at the Asian terminals provide greater economies of scale, and the layout of cargo is often more difficult in the smaller Australian ports. The Fremantle–Singapore data in table 5 are particularly affected by these factors as Fremantle has much lower annual terminal throughput and a lower average exchange per port call than Singapore.

Delay time in port

The number of containers moved per working hour provides only a partial indicator of terminal productivity and does not reflect wider aspects of port productivity. Information on ship delay time in port was therefore obtained from the lines. Delay time is defined as the time waiting for a berth plus the time at berth waiting for labour to arrive plus any delays in departing the berth when work has been completed.

There is significant variation in delay time, with the Asian ports having both the best and worst performance.

Table 5 shows that average delay time varies considerably in both the Australian and Asian ports. The information provided by the lines indicates that Jakarta has by far the highest average delay time. It is followed by Keelung (Taiwan), Sydney, Fremantle, Melbourne, Yokohama, Brisbane, Hong Kong and Osaka. Singapore has the lowest reported level of delay time.

The lines indicated that, where delay time in Australian ports is high, the main underlying factors are the unreliability of berth bookings, inflexible work arrangements and industrial disruption. Congestion due to infrastructure shortages and high traffic growth is the cause of high delay time in Asian ports.

The information on working hours and delay time provided by the lines was also used to estimate the number of containers moved per port hour (based on time at berth plus time waiting for a berth). This indicator reflects aspects of productivity for both the container terminals and broader port operations. Table 5 indicates that, with the exception of Jakarta and to a lesser extent Keelung, the number of containers moved per port hour is significantly higher in the Asian ports. Productivity in Jakarta is adversely affected by severe congestion and infrastructure limitations while Keelung is also congested but to a lesser degree.

On the basis of the data provided by the lines, it was not possible to publish measures of delay time at berth. However, the limited data available indicate that delay time at berth is relatively high at Sydney and Melbourne. Fremantle and Brisbane are in the middle range of the ports covered in table 5.

Charges

Shipping lines also provided information on ship-based charges. These figures include tonnage charges, harbour dues, conservancy, berth hire, tugs, pilotage and mooring/un-mooring.

Table 5 indicates that, for the ports included in the study, ship-based charges are generally much lower at the Asian ports. The only exception involves the third group of ports in table 5 where ship-based charges for Brisbane, Yokohama and Osaka are similar.

For the ports included in the study, ship-based charges are generally much lower at the Asian ports.

This information provides only a partial measure of relative waterfront charges as it focuses on the charges incurred by shipping lines. It excludes cargo-based charges, stevedoring charges, customs brokers' fees and road transport charges. Ship-based charges generally account for less than 10 per cent of port interface costs for a container at Australian ports. However, ship-based charges are of particular interest to the shipping lines.

Concluding comments

Overall, the data provided by the shipping lines indicate that stevedoring productivity is substantially higher in the Asian ports. Ship-based charges are lower in Asia. There is significant variation in delay time, with the Asian ports having both the best performance (Singapore) and the worst performance (Jakarta). Average delay times in Sydney, Fremantle and Melbourne are higher than delay time in Brisbane.

In considering these results, it should be recognised that the analysis is based on limited information. Also, the data do not cover aspects of the waterfront such as the interface between the terminal and land transport where Australia's infrastructure is better than that of many Asian countries. Although only six Asian ports are included in the Bureau's analysis, they are all major ports in the Australia–Asia trades.

BTCE MARITIME RESEARCH

The Bureau of Transport and Communications Economics (BTCE) undertakes research relevant to the policy interests of the Department of Transport and Regional Development and the Department of Communications and the Arts. The research covers maritime, aviation, transport externalities, land transport and communications issues.

The BTCE's annual research program is designed to inform public debate and to assist policy formulation processes. The results of its planned research projects are usually published and distributed widely. In addition, the BTCE responds to requests for information, policy analysis and advice from Ministers, Parliamentary Committees and Departmental Policy Divisions.

The maritime area has three high priority projects under way:

- Continuing production of our newsletter *Waterline*, which provides data and commentary principally on port performance but also on broader maritime issues when appropriate;
- Evaluation of changing trends in the patterns of international liner shipping and their impact on Australian shippers and shipping, and the demand for port services;
- A joint project with the Indonesian Government to investigate transport synergies between eastern Indonesia and northern Australia.

Information on the BTCE's maritime research can be obtained from the Research Manager, Sue Elderton, (06) 274 6800. Information on individual projects is also available from the project leaders. For *Waterline*, contact Kym Starr, (06) 274 6857. For the globalisation and Indonesian projects, contact Neil Gentle, (06) 274 6735.

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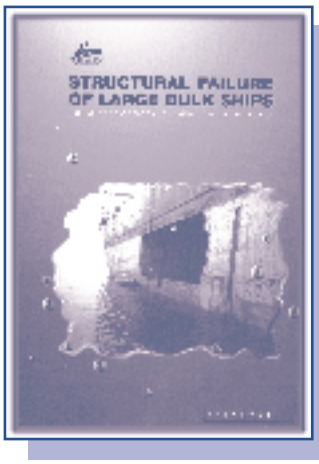

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ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AGPS	Australian Government Publishing Service
AMWU	Australian Manufacturing Workers Union
ASU	Australian Services Union
AWU-FIMEE	Australian Workers Union and the Federation of Industrial, Manufacturing and Engineering Employees
BIE	Bureau of Industry Economics
BTCE	Bureau of Transport and Communications Economics
CEPU	Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union
CFMEU	Construction, Forestry, Mining and Energy Union
DWT	Deadweight Tonnage
MUA	Maritime Union of Australia
teu	Twenty foot equivalent unit
TWU	Transport Workers Union
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time the ship is alongside the berth offering for work whether worked or not, measured from labour ordered to last labour ashore.

Elapsed rate—the number of teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at the ship operator's request.

Net rate—the number of teus moved per net hour.

Crane rate—the number of teus moved per crane per net hour.

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ABS 1995, *International Cargo Statistics 1994-95*, ABS, Canberra.

BIE 1995, *International Benchmarking—Waterfront 1995*, Report 95-16, AGPS, Canberra.

TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, JUN 91–DEC 95

Port	Jun-91	Sep-91	Dec-91	Mar-92	Jun-92	Sep-92	.....	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Past four quarters
Brisbane																		
Ships handled	89	91	91	85	96	93	na	106	111	112	140	140	187	136	123	135	132	526
Total teus	33845	38074	36021	28235	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	194078
Crane rate	13.4	14.3	14.9	17.0	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.5	18.9	18.4
Elapsed rate	16.3	16.9	17.8	19.6	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	20.1	21.0	19.5
Net rate	17.4	18.2	19.6	21.1	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.8	24.6	22.5
Sydney																		
Ships handled	114	109	109	105	109	112	na	205	238	177	240	223	221	218	202	192	203	815
Total teus	58075	67601	72250	71702	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	577158
Crane rate	14.1	15.5	17.5	18.6	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	18.7
Elapsed rate	13.6	16.5	18.4	19.9	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	21.9
Net rate	15.5	18.4	22.7	26.3	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	27.6
Melbourne																		
Ships handled	117	113	125	108	121	121	na	235	306	211	265	267	244	265	228	221	227	941
Total teus	73921	75427	95019	73441	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	661830
Crane rate	14.1	15.7	14.8	16.7	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.6	19.8	19.6	20.0
Elapsed rate	17.0	17.6	18.7	19.2	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	23.6
Net rate	19.8	20.9	20.5	22.1	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	26.5
Adelaide																		
Ships handled	19	20	21	22	20	21	na	21	26	28	34	31	33	35	50	34	42	161
Total teus	9402	9442	10998	10810	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	70145
Crane rate	17.7	17.0	18.0	19.8	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.0
Elapsed rate	23.2	19.6	25.3	27.2	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	25.2
Net rate	23.7	20.5	25.9	28.2	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	26.1
Fremantle																		
Ships handled	74	76	77	71	75	72	na	116	115	127	135	121	124	128	136	139	124	527
Total teus	23696	22713	26522	25403	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	184408
Crane rate	15.8	15.0	16.4	21.0	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	19.6
Elapsed rate	12.9	12.1	13.1	16.8	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	14.1	16.2
Net rate	16.6	15.8	16.4	21.0	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	20.8
Five Ports																		
Ships handled	413	409	423	391	421	419	na	683	796	745	814	782	809	782	739	721	728	2970
Total teus	198939	213257	240810	209591	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	1687619
Crane rate	14.3	15.4	15.9	18.0	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	19.4
Elapsed rate	15.4	16.4	17.8	19.4	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.6	21.5	21.8
Net rate	17.7	18.9	20.6	23.3	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.6	25.3	25.7

na Not available.

Notes 1. From September 1993 award shift breaks are included in the definition of net time which is used to calculate the net rate and the crane rate.

2. Indicators are for quay crane operations on cellular ships calling at the container terminals.

Sources WIRA, Patrick, Conaust and SeaLand.

BTCE

WATERLINE

JUNE 1996 ISSUE NO. 7

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

IN BRIEF

Stevedoring performance

Container terminal productivity improved at each of the mainland capital city ports in the March quarter 1996. However, overall productivity was not significantly above the levels achieved at the end of the WIRA process in 1992.

The five port average crane rate was 20.3 teus per hour in the March quarter, up from 19.2 teus per hour in the December quarter 1995. The net rate increased to 26.9 teus per hour (from 25.3 teus per hour) and the elapsed rate rose to 23.2 teus per hour (from 21.7 teus per hour).

In Brisbane, the crane rate increased to 20.0 teus per hour in the March quarter. The elapsed rate also improved. There was a marginal fall in the net rate following a decline in average crane intensity.

The Sydney crane rate rose to 19.8 teus per hour in the March quarter. The net rate and the elapsed rate also increased.

Melbourne's performance improved in the March quarter, with a rise in the crane rate to 20.5 teus per hour and increases in the net rate and the elapsed rate.

In Adelaide, the crane rate increased slightly to 21.5 teus per hour. The net rate and the elapsed rate were also up.

Fremantle's crane rate rose to 21.2 teus per hour in the March quarter, and there were also increases in the net rate and the elapsed rate.

page two

Port Interface Cost Index

The Bureau's national Port Interface Cost Index indicates that shore-based shipping charges per teu fell by 0.1 per cent for imports and rose by 0.4 per cent for exports in July–December 1995 compared with the January–June period. In real terms, charges fell by 1.6 per cent for import teus and by 1.1 per cent for export teus.

Several factors contributed to the changes in the national index. Ship-based charges per teu fell in most ports. Customs brokers' fees generally declined for import containers, and were unchanged for export containers in most ports. Road transport charges increased in two ports.

page six

Port performance

The total tonnage of cargo handled by the five mainland capital city ports declined by 3.6 per cent in July–December 1995 compared with the previous half-year. Container traffic (teus) increased by 5.1 per cent over this period. In the full year 1995, a total of 2.1 million teus were exchanged at the five ports, a 6.8 per cent increase over the 1994 figure.

Employment at the five port authorities fell by 2.4 per cent in July–December 1995 compared with the previous half-year.

Median turnaround time for container ships increased in three ports and declined in two ports in the July–December period.

page ten

Performance comparisons with Europe

The Bureau's third international comparison of waterfront performance covers selected Australian and European container ports.

Data provided by shipping lines indicate that, during 1995, the European ports had higher crane productivity and, in most cases, higher crane intensity than the Australian ports. These factors resulted in higher ship working rates at the European ports. In almost all cases, ship delay time was lower at the European ports.

page twelve

STEVEDORING PERFORMANCE INDICATORS

Figures 1 to 6 provide information on stevedoring performance at Australia's major container terminals over the period to the end of the March quarter 1996. Time series data on container terminal performance from the *Waterline* database are contained in table 8 (page 15).

Five port average

Overall stevedoring performance improved in the March quarter 1996, reflecting higher productivity at all of the mainland capital city ports.

The five port average *crane rate* was 20.3 teus per hour, up from 19.2 teus per hour in the previous quarter (figure 1). This was the highest average crane rate since the September quarter 1993.

The five port average *net rate* increased to 26.9 teus per hour in the March quarter from 25.3 teus per hour in the December quarter. Average crane intensity was virtually unchanged at 1.32.

The five port average *elapsed rate* was 23.2 teus per hour in the March quarter, up from the revised figure of 21.7 teus per hour in the December quarter. On a per crane basis, the figure increased to 17.5 teus per hour from 16.4 teus per hour in the previous quarter.

The five port average for the proportion of elapsed time not worked was 13.8 per cent in the March quarter. This was below the revised December quarter figure of 14.3 per cent, the decline reflecting falls in most of the ports.

Although average stevedoring performance at the five ports improved in the March quarter 1996, overall productivity was not significantly above the levels achieved at the end of the WIRA process in 1992. The *Waterline* database indicates that the five port average crane rate of 20.3 teus per hour in the March quarter was marginally higher than the September quarter 1992 figure of 20.1 teus per hour. The net rate of 26.9 teus per hour in the March quarter compared with a figure of 26.5 teus per hour in the September quarter 1992. The elapsed rate was virtually unchanged at 23.2 teus per hour (compared with 23.1 teus per hour in the September quarter 1992).

Changes in performance since the end of the WIRA process have varied between ports. The *Waterline* database indicates that, between the September quarter 1992 and the March quarter 1996, crane rates rose in four ports (with the increases ranging between 0.2 and 2.4 teus per hour) and fell in one port (by 1.1 teus per hour). Net rates increased in two ports and declined in three ports while elapsed rates rose in three ports and fell in two ports over the period.

Brisbane

Stevedoring performance in Brisbane generally improved during the March quarter (figure 2).

The crane rate was 20.0 teus per hour, up from 18.9 teus per hour in the previous quarter. This was the third consecutive rise in the crane rate. The March quarter figure was the highest crane rate in Brisbane since the September quarter 1994.

The net rate fell marginally to 24.4 teus per hour in the March quarter from 24.6 teus per hour in the December quarter. This reflected a decline in average crane intensity (to 1.22 from the previous figure of 1.30) which outweighed the impact of the higher crane rate.

Brisbane's elapsed rate was 21.3 teus per hour in the March quarter, up from 21.0 teus per hour in the December quarter. On a per crane basis, the figure increased to 17.5 teus per hour from 16.2 teus per hour in the previous quarter.

The average proportion of elapsed time not worked in Brisbane was 12.6 per cent in the March quarter, down from 14.6 per cent in the December quarter.

Sydney

Sydney's stevedoring performance improved in the March quarter (figure 3). A Productivity Employment Proposal (PEP) was introduced at the CTAL terminal on a trial basis subsequent to this period.

The crane rate was 19.8 teus per hour in the March quarter, up from 18.5 teus per hour in the previous quarter. The March quarter figure was the highest crane rate in Sydney since the December quarter 1993.

The net rate increased to 27.5 teus per hour in the March quarter from 25.7 teus per hour in the December quarter. Average crane intensity was 1.39 compared with 1.41 in the previous quarter.

Sydney's elapsed rate was 23.5 teus per hour in the March quarter, up from 21.8 teus per hour in the December quarter. On a per crane basis, the figure increased to 16.9 teus per hour from 15.5 teus per hour in the previous quarter.

The average proportion of elapsed time not worked in Sydney was 14.5 per cent in the March quarter, down from 15.2 per cent in the December quarter.

Melbourne

In Melbourne, there was an improvement in stevedoring performance in the March quarter (figure 4).

The crane rate was 20.5 teus per hour, up from 19.6 teus per hour in the previous quarter. The March quarter 1996 figure was the highest

crane rate in Melbourne since the March quarter 1995.

The net rate increased to 28.3 teus per hour in the March quarter from 26.4 teus per hour in the December quarter. Average crane intensity was 1.38 compared with 1.35 in the previous quarter.

Melbourne's elapsed rate was 24.4 teus per hour in the March quarter, up from 22.8 teus per hour in the December quarter. On a per crane basis, the figure increased to 17.7 teus per hour from 16.9 teus per hour in the previous quarter.

The average proportion of elapsed time not worked was 13.9 per cent in the March quarter, similar to the figure of 13.6 per cent in the December quarter.

Adelaide

Adelaide's stevedoring performance improved during the March quarter (figure 5).

The crane rate increased slightly to 21.5 teus per hour from 21.4 teus per hour in the previous quarter. The March quarter figure was equal to the highest crane rate in Adelaide since the WIRA process.

The net rate increased to 27.2 teus per hour in the March quarter from 26.7 teus per hour in the December quarter. Average crane intensity was 1.27 compared with 1.25 in the previous quarter.

Adelaide's elapsed rate was 26.6 teus per hour in the March quarter, up from 26.1 teus per hour in the December quarter. The March quarter figure was the second highest elapsed rate in the port since the end of the WIRA process. On a per crane basis, the figure was 21.0 teus per hour compared with 20.9 teus per hour in the previous quarter.

Adelaide continued to have a very low proportion of time not worked. The average proportion of elapsed time not worked was 2.2 per cent in the March quarter, the same as the December quarter figure.

Fremantle

Stevedoring performance in Fremantle improved in the March quarter (figure 6).

The crane rate was 21.2 teus per hour, up from 19.2 teus per hour in the previous quarter. This was the highest crane rate in Fremantle since the December quarter 1994.

The net rate increased to 22.2 teus per hour in the March quarter from 19.8 teus per hour in the December quarter. Average crane intensity was 1.05 compared with 1.03 in the previous quarter.

Fremantle's elapsed rate was 18.5 teus per hour in the March quarter, up from the revised figure of 15.8 teus per hour in the December quarter. On a per crane basis, the figure rose to 17.6 teus per hour from 15.3 teus per hour in the previous quarter.

The average proportion of elapsed time not worked in Fremantle was 17.1 per cent in the March quarter, down from the revised figure of 20.1 per cent in the December quarter.

Containers per hour

Waterline has traditionally reported stevedoring indicators on the basis of teus per hour as this format provides continuity with the earlier data published by WIRA. For the purposes of these indicators, a 40 foot container is classified as two teus.

Indicators of stevedoring productivity can also be based on the number of containers per hour. These indicators are particularly useful for analysing performance where there is significant variation in the mix of 20 foot and 40 foot containers. Such variations may occur between ports (for example, in international comparisons) and in individual ports over time.

Table 1 presents the major indicators of stevedoring performance in containers per hour for the last two quarters. It covers the same cellular ship calls as the teu data in table 8 (page 15).

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS

(containers per hour)

Port/indicator	Quarter Dec 1995	Mar 1996
Brisbane		
Crane rate	15.8	17.6
Elapsed rate	17.0	18.8
Net rate	20.6	21.5
Sydney		
Crane rate	15.0	15.8
Elapsed rate	17.6	18.7
Net rate	21.0	21.9
Melbourne		
Crane rate	16.3	17.0
Elapsed rate	18.8	20.2
Net rate	21.9	23.4
Adelaide		
Crane rate	18.8	18.9
Elapsed rate	22.8	23.3
Net rate	23.3	23.8
Fremantle		
Crane rate	16.2	17.9
Elapsed rate	13.4	15.7
Net rate	16.7	18.9
Five ports		
Crane rate	15.9	16.9
Elapsed rate	17.7	19.3
Net rate	20.9	22.3

Sources *Patrick, Conaust and SeaLand .*

BTCE

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS

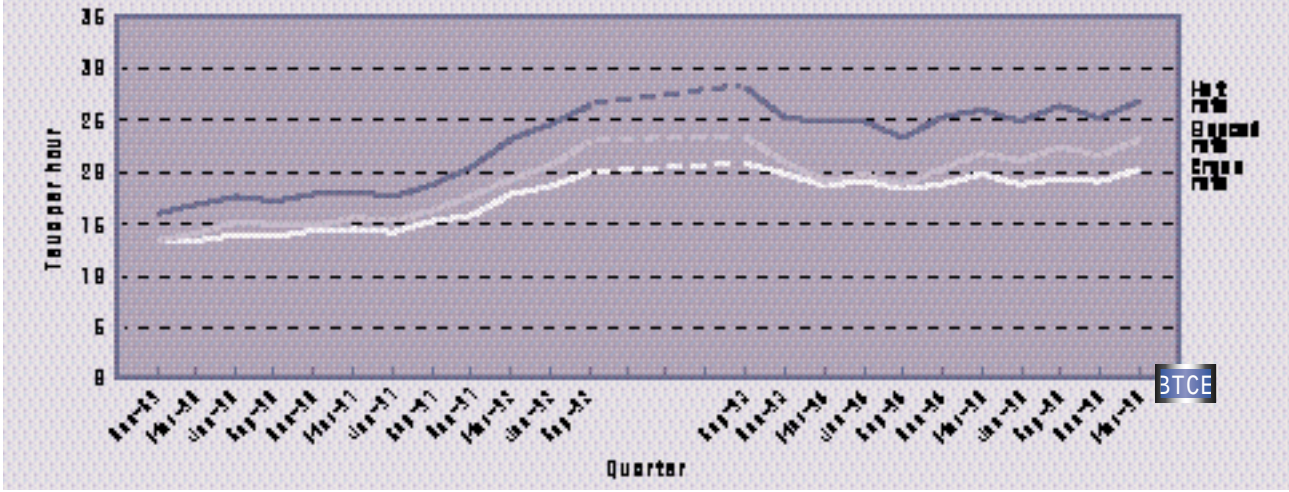


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS

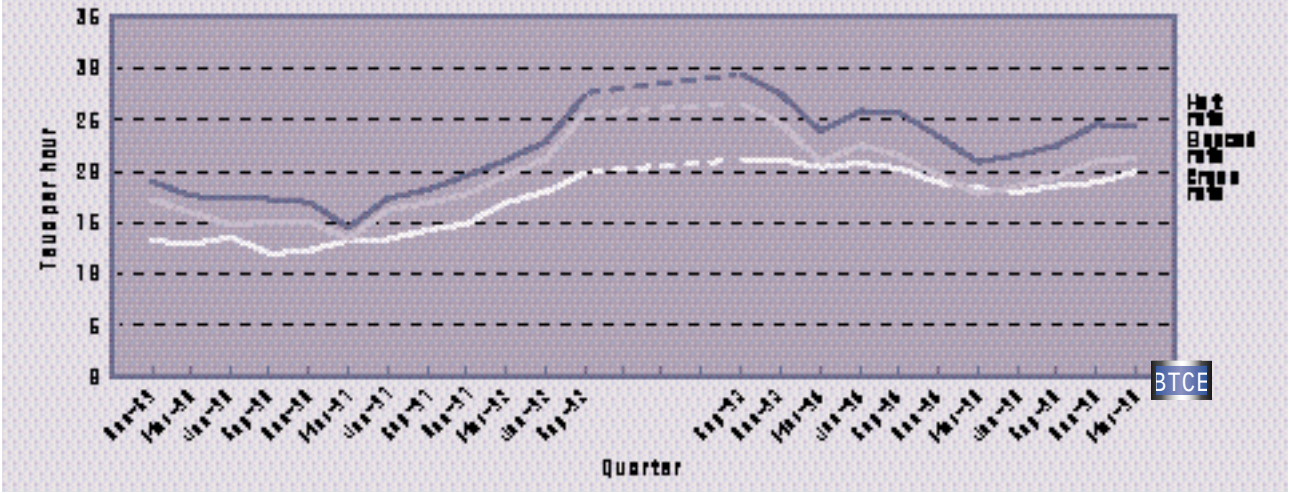
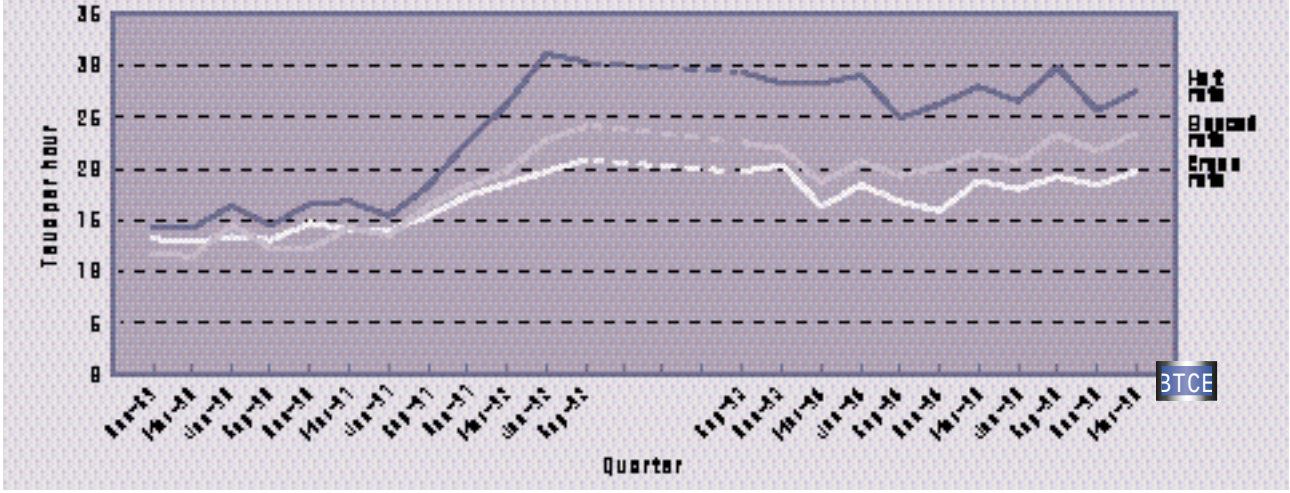


FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This factor lowers the relative magnitude of the figures for the earlier period. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, Conaust and SeaLand.*

FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS

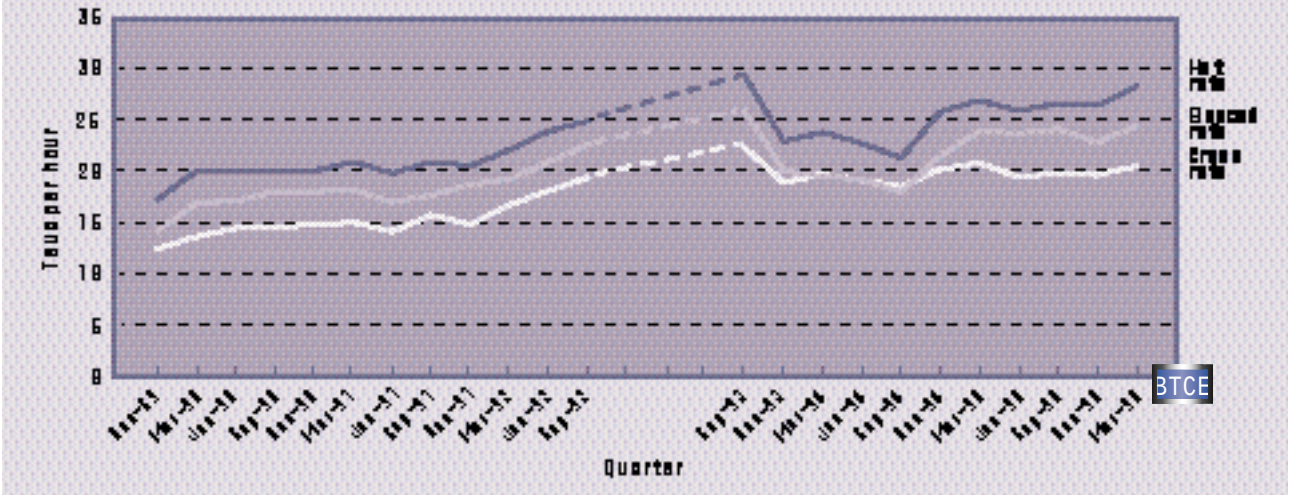


FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS

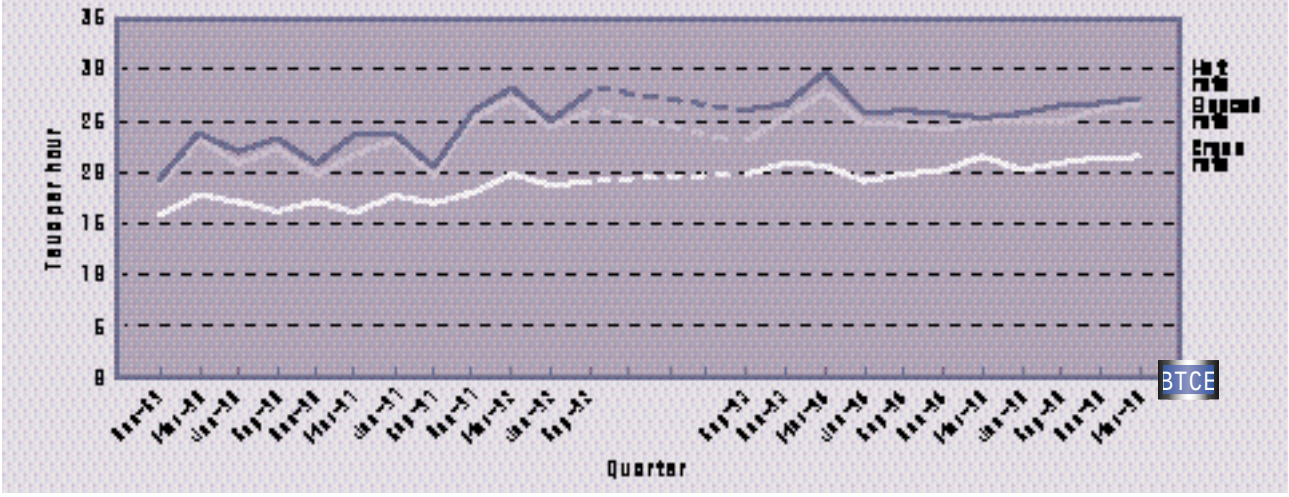
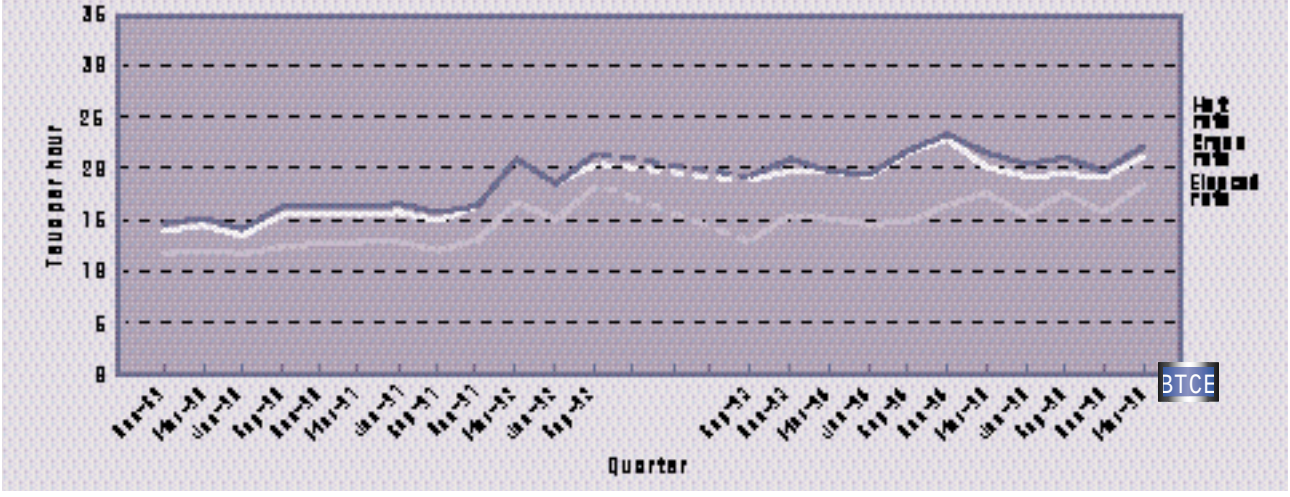


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This factor lowers the relative magnitude of the figures for the earlier period. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, Conaust and SeaLand.*

The indicators in table 1 will be updated in future issues of *Waterline*.

The data in tables 1 and 8 can be used to estimate the proportion of container terminal traffic that comprises 40 foot containers. In the March quarter, the ratio of the number of containers to the number of teus at the five mainland capital city ports varied between 0.80 and 0.88, with a weighted average of 0.83. On the basis of these figures, it is estimated that 40 foot containers accounted for between 13 and 25 per cent of the containers handled at individual ports. The average proportion for the five ports was around 21 per cent. These figures cover containers lifted on and off cellular ships at the major terminals.

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs. It incorporates the charges of various providers of waterfront-related services. These charges represent costs to shipping lines and shippers.

In July–December 1995, total ship-based charges per ship visit fell in two of the ports and increased in one port.

The major components of the Port Interface Cost Index are port and related charges, stevedoring charges and land-based charges. The index is calculated both on a national basis and individually for the five mainland capital city ports.

Cost parameters

The representative ship used to calculate port and related charges for July–December 1995 was unchanged from the ship used in the previous period (table 2).

The number of teus exchanged per port call changed significantly for several ports in July–December compared with the previous half-year. Average teu exchange for the representative ship increased in Brisbane (23.3 per cent), Melbourne (12.3 per cent), Sydney (7.3 per cent) and Adelaide (1.3 per cent). There was a decline in Fremantle (14.8 per cent).

Port and related charges

Port and related charges consist of ship-based and cargo-based components. Information on these charges is presented in table 3.

In July–December 1995, *total ship-based charges per ship visit* fell in two of the ports and increased in one port. They declined by 6.5 per cent in Fremantle as a result of reductions in tonnage, pilotage and mooring/unmooring charges, and fell by 1.3 per cent in Sydney following a reduction in pilotage charges. There was a 2.3 per cent rise in Melbourne as

TABLE 2 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1995

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
LOA (metres)	-	-	-	-	176	176	-	-	-	-
Teus exchanged[a]										
Total	318	392	790	848	726	815	298	302	399	340
Loaded	245	302	655	703	613	688	232	235	328	280
Empty	73	90	135	145	113	127	66	67	71	60
Loaded inwards	86	106	412	442	-	-	81	82	-	-
Loaded outwards	159	196	243	261	-	-	151	153	-	-
Primary produce	-	-	-	-	-	-	45	46	-	-
Ship call parameters[a]										
Number of port calls	3	3	3	3	4	3	3	2	4	5
Elapsed berth time (hrs)	23	29	44	49	38	41	21	21	31	29

- not required.

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

Sources BTCE estimates based on ship call data supplied by port authorities and other port service providers.

TABLE 3 PORT AND RELATED CHARGES, 1995

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995
Ship-based charges ($/teu)										
State government	9.91	8.04	-	-	-	-	6.05	5.97	1.98	2.33
Tonnage	-	-	10.02	9.34	13.99	12.46	14.00	13.81	8.03	7.44
Pilotage	16.13	13.08	4.72	4.01	7.56	6.73	7.89	7.78	6.20	6.47
Towage	31.82	25.82	12.37	11.52	10.12	9.02	41.28	40.73	28.27	33.18
Mooring & unmooring	4.53[r]	3.68	3.98[r]	3.71	3.93[r]	3.50	-	-	3.52	3.24
Berth hire[a]	-	-	-	-	12.44	12.08	-	-	-	-
Total[b]	62.39[r]	50.61	31.10[r]	28.59	48.04[r]	43.79	69.22	68.29	48.00	52.65
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	46.75	46.75	65.00	65.00	49.79	49.79
Exports	26.00	26.00	45.00	45.00	46.75	46.75	62.00	62.00	49.79	49.79
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berthing	-	-	-	-	-	-	-	-	14.63	14.63
Total port and related charges ($/teu)										
Loaded imports	130.39[r]	118.61	91.10[r]	88.59	94.79[r]	90.54	134.22	133.29	112.42	117.07
Loaded exports	130.39[r]	118.61	76.10[r]	73.59	94.79[r]	90.54	131.22	130.29	112.42	117.07
Charges per ship visit ($/visit)										
Total ship-based charges	19840[r]	19840	24571[r]	24241	34876[r]	35689	20626	20625	19153	17902
Empty teus[c]	1040	1283	3375	3625	1537	1727	0	0	1311	486

- not applicable.

r Incorporates revised charges for mooring/unmooring.

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

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

c. Sum of wharfage, harbour dues and berthing charges per empty teu, multiplied by average exchange of empty teus.

Note Port and related charges are based on the parameters described in table 2.

Sources BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers.

the higher average berth time resulted in higher payments for (time-based) berth hire. Total ship-based charges per visit were unchanged in Brisbane and remained virtually the same in Adelaide.

Table 3 indicates that, for an operator of a vessel similar in size to the representative ship, Fremantle had the lowest total ship-based charges per ship visit in July–December 1995. It was followed by Brisbane and Adelaide.

The level of *ship-based charges per teu* provides an indication of the impact of ship-based charges on shippers. This measure is affected by the total charges per visit and by the number of teus exchanged per visit. With a given level of charges per ship visit, a reduction in the number of teus exchanged will result in a higher charge per teu to bring the ship into the port. Conversely, an increase in the average exchange will reduce the cost per teu with a given level of charges per visit.

Overall, there were significant reductions in total port and related charges in most ports during the second half of 1995.

Ship-based charges per teu fell in four of the ports in July–December 1995 compared with the previous period. The reductions for Brisbane (18.9 per cent), Melbourne (8.8 per cent) and Adelaide (1.3 per cent) were attributable to the increases in average exchanges. The reduction in Sydney (8.1 per cent) reflected both a higher average exchange and lower ship-based charges per visit. Ship-based charges per teu in Fremantle increased by 9.7 per cent, with the reduction in the average exchange outweighing the effects of lower ship-based charges per visit.

Cargo-based charges for loaded containers were unchanged in all ports in the July–December period. As part of an overall reduction of 9.5 per cent in Fremantle's port pricing from July 1995, wharfage on empty containers was reduced by 50 per cent and berth hire on empty containers was abolished.

Overall, there were significant reductions in *total port and related charges* (ship-based charges plus cargo-based charges) in most ports during the second half of 1995. On a teu basis, port and related charges for loaded export containers fell by 9.0 per cent in Brisbane, 4.5 per cent in Melbourne, 3.3 per cent in Sydney, and 0.7 per cent in Adelaide. A rise of 4.1 per cent in Fremantle reflected the impact of higher ship-based charges per teu resulting from the lower average exchange per ship visit.

Stevedoring charges

The stevedoring charges used in this issue of *Waterline* were obtained from the Australian Competition and Consumer Commission (ACCC). Data on these charges were previously published by the Prices Surveillance Authority (PSA).

Preliminary estimates provided by the ACCC indicate that the national weighted average revenue per teu for the ACCC's sample of container terminal operations was $203 in 1995. This represented an increase of 1.0 per cent over the revised 1994 average of $201.

Land-based charges

The land-based charges in the Port Interface Cost Index comprise customs brokers' fees and road transport charges. Changes in these components are detailed in table 4.

The Bureau's survey of customs brokers indicates that in July–December 1995 customs brokers' fees for import containers declined by $4 per teu in Brisbane, $5 per teu in Melbourne, and $2 per teu in Adelaide and Fremantle. Fees for import containers were unchanged in Sydney.

For export containers, customs brokers' fees fell by $5 per teu in Brisbane and rose by $7 per teu in Sydney. Fees for export containers were unchanged in the other ports.

Road transport charges increased by $10 per teu in Sydney and by $2 per teu in Melbourne in July–December compared with the previous period. There were no changes in road transport charges at the other ports.

Indexes for individual ports

Table 4 provides details of the Port Interface Cost Index for individual ports in July–December 1995 and the previous half-year. It indicates that total shore-based shipping costs (charges) per teu declined in Brisbane, Melbourne and Adelaide. Total costs increased in Sydney and Fremantle.

The sources of change in the index for each port between January–June 1995 and July–December 1995 are shown in figure 7. Changes in port and related charges per teu and

TABLE 4 PORT INTERFACE COSTS, 1995

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995
Imports										
Ship-based charges	62[r]	51	31[r]	29	48[r]	44	69	68	48	53
Cargo-based charges	68	68	60	60	47	47	65	65	64	64
Stevedoring[p]	203[r]	203	203[r]	203	203[r]	203	203[r]	203	203[r]	203
Customs brokers' fees	125	121	153	153	149	144	141[r]	139	141[r]	139
Road transport charges	175	175	300	310	245	247	142	142	185	185
Total imports[a]	633[r]	618	748[r]	755	692[r]	685	620[r]	618	641[r]	644
Exports										
Ship-based charges	62[r]	51	31[r]	29	48[r]	44	69	68	48	53
Cargo-based charges	68	68	45	45	47	47	62	62	64	64
Stevedoring[p]	203[r]	203	203[r]	203	203[r]	203	203[r]	203	203[r]	203
Customs brokers' fees	84	79	101	108	91	91	71[r]	71	71[r]	71
Road transport charges	175	175	300	310	245	247	142	142	185	185
Total exports[a]	592[r]	575	680[r]	694	633[r]	631	548[r]	547	572[r]	576

r *Revised figure.*

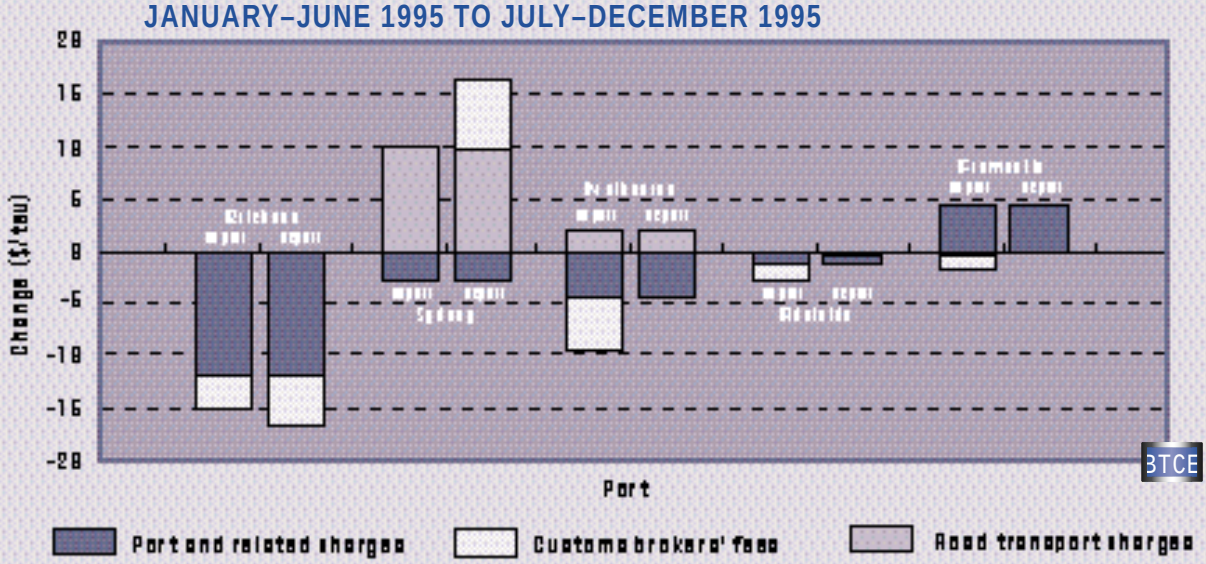
p *Preliminary estimate.*

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

Note *Based on parameters described in table 2.*

Sources *BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charges data supplied by ACCC.*

FIGURE 7 SOURCES OF CHANGES IN PORT INTERFACE COSTS FOR INDIVIDUAL PORTS, JANUARY–JUNE 1995 TO JULY–DECEMBER 1995



Sources *BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charges data supplied by ACCC.*

customs brokers' fees were the only factors contributing to the changes in the index in Brisbane, Adelaide and Fremantle. In Sydney and Melbourne, changes in road transport charges also affected the index.

National index

Data on the national Port Interface Cost Index are presented in table 5. In overall terms, port interface costs (charges) per teu declined by 0.1 per cent for imports and rose by 0.4 per cent for exports in July–December 1995 compared with the previous half-year. When adjusted by the implicit price deflator for gross non-farm product, the national index for imports decreased by 1.6 per cent in real terms. The export index fell by 1.1 per cent in real terms.

In overall terms, port interface costs per teu declined by 0.1 per cent for imports and rose by 0.4 per cent for exports in July–December 1995 compared with the previous half-year.

Several factors contributed to the changes in the national index between the January–June and July–December periods. Ship-based charges per teu fell in most ports. Customs brokers' fees generally declined for import containers and were unchanged for export containers in most ports. Road transport charges increased in two ports. Cargo-based charges for loaded containers were unchanged in all ports.

TABLE 5 THE NATIONAL PORT INTERFACE COST INDEX

	Jul–Dec 1992	Jan–Jun 1993	Jul–Dec 1993	Jan–Jun 1994	Jul–Dec 1994	Jan–Jun 1995	Jul–Dec 1995	Total change[a]
	($/teu)							
Imports	696	675	670	690	684	697[r]	696	0.0%
Exports	617	608	612	633	624	633[r]	636	3.1%

r *Incorporates revised mooring/unmooring charges in Brisbane & Melbourne, and revised customs brokers' fees in Adelaide & Fremantle.*

a. *Percentage change since Jul–Dec 1992.*

Note *Figures prior to Jul–Dec 1995 incorporate revised ACCC estimates of stevedoring charges and revised mooring/unmooring charges for Sydney.*

Sources *BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charges data supplied by ACCC.*

PORT PERFORMANCE

Information on the non–financial performance of the five mainland capital city ports and their port authorities during 1995 is presented in table 6. The next series of financial indicators will be published after the port authorities' 1995/96 financial statements become available.

Cargo throughput

Table 6 indicates that *total cargo throughput* (bulk and general cargo) at the five ports declined by 3.6 per cent to 39.1 million tonnes in July–December 1995. The decline relative to the January–June period reflected lower throughput at Sydney and Fremantle which outweighed increases at the other ports.

The decline in total cargo throughput in July–December 1995 followed an increase of 2.7 per cent in the previous half-year. Total throughput in July–December 1995 was 1.0 per cent lower than throughput in the corresponding half-year of 1994.

The tonnage of *non-containerised, general cargo* at the five ports declined by 5.4 per cent in July–December 1995 compared with the previous half-year. An increase in cargo at Brisbane was more than offset by declines at the other ports.

Container traffic (teus) at the five ports increased by 5.1 per cent in July–December 1995 compared with the January–June period. Total teus increased at Sydney (6.8 per cent), Melbourne (6.7 per cent) and Brisbane (3.8 per cent). Traffic declined at Fremantle (3.9 per cent) and Adelaide (1.0 per cent). Overall for the five ports, there were increases in empty import teus (8.3 per cent), full export teus (6.7 per cent) and full import teus (5.5 per cent), and a decline in empty export teus (3.6 per cent) in the July–December period.

In the full year 1995, a total of 2.1 million teus were exchanged at the five ports. This represented a 6.8 per cent increase on the 1994 figure.

Container traffic at the five ports increased by 5.1 per cent in July–December 1995 compared with the January–June period. In the full year 1995, a total of 2.1 million teus were exchanged at the five ports, a 6.8 per cent increase on the 1994 figure.

The data in table 6 cover all containers handled at the five mainland capital city ports. They include movements at all terminals and multi-purpose berths, whether by lifting or by movement across the ramps of roll-on/roll-off ships. Table 6 therefore provides a more comprehensive measure of container traffic than table 8 which only includes containers lifted on and off cellular ships at major container terminals in the five ports.

Total employment at the five port authorities fell by 2.4 per cent in July–December 1995 compared with the January–June period.

Employment

Table 6 indicates that total employment at the five port authorities fell by 32 (2.4 per cent) in July–December 1995 compared with the January–June period. Employment declined in three ports and increased marginally in the other ports. A fall of 9.4 per cent in Adelaide was the largest single change during the period.

The reduction in total employment at the five port authorities in July–December 1995 continued the downward trend recorded in *Waterline* since July–December 1993. Over this two-year period, total employment has fallen by almost 32 per cent as port authorities have restructured their workforces.

Ship turnaround time

The median turnaround time for container ships increased in three ports and declined in two ports in July–December 1995 compared with the January–June period. This indicator is based on total time in port (usually measured from port boundary to port boundary). It is not directly comparable with the estimated stevedoring time for a 560 teu exchange (based on time between labour first ordered and last labour off the ship) that has also been reported in previous issues of *Waterline*.

In the July–December 1995 period, the 95th percentile turnaround time increased in all of the ports. This figure indicates the turnaround time that is equalled or bettered by 95 per cent of ships using the port. It provides a partial indicator of the variability of ship turnaround time in each port.

TABLE 6 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1995

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five Ports[c]	
	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1995	Jul–Dec 1995
Total cargo throughput ('000 tonnes)	9248	9258	10272	9884	8118	8830	2211	2268	10729	8874	40578	39114
Non-containerised general cargo ('000 tonnes)[a]	262	339	539	490	941	900	153	126	316	237	2211	2091
Containerised cargo (teus exchanged)												
Full import	39009	37075	166140	178643	187394	202013	9617	10291	43546	42041	445706	470063
Empty import	16850	22435	6910	7583	29431	31168	5856	5155	9466	7883	68513	74224
Full export	50650	54646	97353	109955	176400	185724	16889	16824	39389	38980	380681	406129
Empty export	11212	8037	55339	51574	41681	45015	1552	1317	8483	8048	118267	113991
Total teus	117721	122193	325742	347755	434906	463920	33914	33587	100884	96952	1013167	1064407
Average total employment	226	228	233	239	392	381	254	230	223	218	1328	1296
Turnaround time (hrs)[b]												
Median result	30.7	33.7	48.2	47.9	39.2	42.7	28.0	26.1	29.7	32.9	-	-
95th percentile	60.7	63.2	92.2	95.2	81.8	104.6	58.0	59.5	86.3	104.5	-	-

- not applicable.

a. Excludes bulk cargoes.

b. Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.

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

Source AAPMA.

BTCE

RELIABILITY

Reliability is a key element of waterfront performance in Australia. A recent survey indicated that liner shipping companies consider the reliability of pilotage, towage and stevedoring services to be more important than the prices of these services (BIE 1995, 56). There has been frequent criticism of the level of reliability on the Australian waterfront, particularly for liner shipping.

Studies of waterfront reliability have generally focused on the variability of performance or on ship delays (particularly unanticipated delays). The overall level of waterfront reliability reflects the performance of stevedores, port authorities, pilots and towage operators. The direct causes of poor reliability include work practices, industrial disputes, equipment breakdowns (both ashore and aboard ship), management strategies and congestion of facilities.

The level of reliability on the waterfront affects shipping lines' published schedules (for example, whether fixed day sailings are offered) and their ability to maintain these schedules. If the waterfront is unreliable, the lines incur additional costs in areas such as port charges, container leasing, transhipment of cargo, fuel and other ship operating costs, and ship capital or chartering costs. Where poor reliability in one port affects ship departure times and results in unpredictable ship arrival times at other Australian ports, there will be adverse effects on stevedoring and other waterfront services (and the users of these services) in the other ports.

These costs to shipping lines and providers of waterfront services will generally be reflected in higher freight rates and charges for shippers. Poor reliability on the waterfront will also impose costs on shippers through higher financing costs for exports, higher inventory costs for imports and loss of sales in overseas markets.

Information on waterfront reliability was contained in the Bureau's 1995 report on the effectiveness of the WIRA process (BTCE 1995, 51–52, 60–61, 88–91). Benefits from improved waterfront reliability were estimated on the basis of greater certainty in sailing days, lower inventory levels for importers and lower financing costs for exporters. The report used some of the findings of an earlier Bureau study which had estimated that, in 1988, the total costs of waterfront unreliability to national welfare were in the range of $850 million to $1 000 million (BTCE 1990).

Waterfront reliability was also considered in a 1995 report by the BIE (1995, xvi, 57–60). In responses to a qualitative survey, liner shipping companies stated that the reliability of waterfront services in Australian ports lagged well behind the levels achieved in overseas ports. A shipping line's data on container terminal performance indicated that the gap between planned and actual production rates for its ships was generally larger in Australian ports than in European and New Zealand ports. In addition, ship turnaround times were more variable in Australia, with a sizeable proportion of the Australian delays likely to seriously affect ship schedules.

The monitoring of waterfront performance in *Waterline* currently focuses on productivity, charges and financial performance. There is only limited information on reliability. Aspects of reliability are reflected in the indicators of ship turnaround time (median and 95th percentile) at the five mainland capital city ports. The major stevedoring indicators also provide some broad information on the variability of performance. In addition, issue 6 of *Waterline* contained information on industrial disputes in stevedoring and average ship delays at various Australian and Asian ports.

The Bureau is currently working to develop improved indicators of waterfront reliability for inclusion in *Waterline* on a regular basis. The process will include consultation with major industry participants to discuss concepts, methodologies and data sources for such indicators.

INTERNATIONAL COMPARISONS - EUROPE

Issue 5 of *Waterline* contained the results of the Bureau's initial work on international comparisons of waterfront performance, covering several container ports in Australia and New Zealand. The second part of this work, published in issue 6, focused on various Australian and Asian container ports.

There are difficulties with drawing firm conclusions about relative efficiency from such international comparisons since performance is affected by local conditions beyond industry control and the data are limited to specific ports and terminals. However, international comparisons do provide a broad indication of the relative performance of sectors of Australia's waterfront.

The third part of the Bureau's work on international comparisons covers selected Australian and European container ports. It is based on information supplied by shipping lines operating direct services between Australian and European ports during 1995. The lines provided data for specific container ships, with the result that the comparisons are based on consistent ship characteristics across each group of ports.

The results of the Bureau's analysis are summarised in table 7. The ports included in the table reflect both the scope of the lines' operations and the need to maintain the confidentiality of individual lines' data.

The stevedoring performance indicators for Australian ports in table 7 are not directly comparable with *Waterline's* regular stevedoring indicators. Table 7 is based on *data for specific ships* whereas tables 1 and 8 contain *averages for major container terminals*. In addition, the indicators of crane productivity and ship working rates in table 7 are expressed in *containers per hour* whereas the indicators in table 8 (and figures 1 to 6) are in *teus per hour*. It should also be noted that the stevedoring data for the three port groups in table 7 are not directly comparable with each other as they are based on data from different lines and therefore reflect different ship characteristics.

Table 7 contains three indicators of stevedoring performance—crane productivity, crane intensity and the ship working rate. Data on ship delay time provide information on other aspects of terminal and port performance.

Crane productivity

Crane productivity is defined as the average number of containers moved per crane per working hour. Working hours cover the period between the commencement and completion of stevedoring work (similar to the elapsed time in *Waterline*). Crane productivity is not directly comparable with the crane rate, based on net time and terminal averages, which is reported in *Waterline's* regular stevedoring indicators.

Table 7 indicates that crane productivity at the European ports was higher than crane productivity at the Australian ports in all cases. In the first group, the average figure for the European ports (20.0 containers per hour) was 46 per cent above the average for the Australian ports (13.7 containers per hour). In the second group of ports, crane productivity at Felixstowe (23.5 containers per hour) was well above the highest figure at an Australian port (14.9 containers per hour at Melbourne). In the third group, crane productivity at La Spezia (17.1 containers per hour) was

higher than the figure at Melbourne (14.6 containers per hour). Other data provided by two of the lines indicated that crane productivity at Adelaide was also below typical levels at the European ports.

Some additional information on crane productivity at particular ports was provided to the Bureau but could not be included in table 7 as data were only available for individual lines. For one line, crane productivity at Antwerp (with a relatively large number of containers exchanged) was 35 containers per hour, more than twice the rate at the best Australian port used by its ships. For another line, crane productivity at Barcelona was 19.5 containers per hour, 24 per cent above the rate for its ships at the best Australian port.

The discussion of waterfront reform has traditionally attributed low crane productivity in Australia to factors such as work practices and terminal equipment. The average number of containers exchanged, and the proportion of a ship's cargo that is exchanged, will also potentially affect crane productivity at a particular port. Table 7 indicates that the average container exchange at Fremantle was relatively low, while the average exchanges at Sydney and Melbourne were at least comparable with those at most of the European ports. Other factors that contribute to variations in crane productivity between ports include differences in typical cargo layout, lashing/unlashing work and weather.

Crane intensity

Crane intensity is defined as the average number of cranes used to work a ship.

Table 7 indicates that crane intensity was generally higher at the European ports. In the first group, average intensity was 1.8 at the European ports compared with 1.4 at the Australian ports. However, Sydney had a higher crane intensity than Zeebrugge (and Melbourne's figure was the same). In the second group of ports, Felixstowe had a crane intensity of 2.4 compared with the highest Australian figure of 1.8 at Sydney. In the third group, Sydney had a higher crane intensity than La Spezia.

The general factors that affect average crane intensity at a port include the number of cranes available at each terminal and work practices. Higher crane intensities are often associated with economies of scale, with table 7 indicating that this is likely to be a factor at the larger European ports (Rotterdam, Hamburg and Felixstowe). For a particular ship call, crane intensity will also be affected by the amount of cargo exchanged and the layout of cargo on the ship.

Ship working rate

The number of containers moved per working hour is an indicator of the speed with which ships are worked. It is similar to the elapsed rate regularly reported in *Waterline*.

Table 7 shows that ship working rates were higher at the European ports, reflecting the combined effect of higher crane productivity and (in most cases) higher crane intensity. In the first group, the average ship working rate at the European ports (34.7 containers per hour) was 85 per cent higher than the average rate at the Australian ports (18.8 containers per hour). In the second group of ports, the ship working rate at Felixstowe (56.4 containers per hour) was well

TABLE 7 PERFORMANCE COMPARISONS FOR SELECTED AUSTRALIAN AND EUROPEAN CONTAINER PORTS,1995

		Shipping line data					
Port/group	Port throughput (teus 1994)	Port calls	Containers exchanged per call	Crane productivity (containers/hr)	Crane intensity	Ship working rate (containers/hr)	Delay time[a] (hrs)
Sydney	639 000	35	887	13.6	1.7	23.1	12.0
Melbourne	801 244	51	742	14.9	1.4	20.9	5.2
Fremantle	189 272	36	320	12.5	1.0	12.5	8.3
Hamburg	2 725 718	69	731	19.6	1.9	37.2	0.2
Rotterdam	4 539 254	81	746	16.0	2.0	32.0	1.7
Tilbury	369 221	57	1 137	18.2	1.8	32.8	4.5
Zeebrugge	639 184	49	344	26.2	1.4	36.7	1.0
Sydney	639 000	26	1 011	12.9	1.8	23.2	10.6
Melbourne	801 244	39	700	14.9	1.5	22.4	3.4
Fremantle	189 272	31	260	13.1	1.1	14.4	6.0
Felixstowe	1 734 352	41	763	23.5	2.4	56.4	0.6
Sydney	639 000	40	848	13.8	1.6	22.1	11.5
Melbourne	801 244	81	605	14.6	1.3	19.0	6.6
Fremantle	189 272	63	297	13.1	1.0	13.1	7.6
La Spezia	816 280	75	834	17.1	1.4	23.9	3.7

a. *Delay time is the time waiting to berth, plus the time at berth waiting for labour or equipment to arrive, plus any delays in departing the berth when work has been completed.*

Note *All figures are averages with the exception of port calls (which are total calls for all lines reporting for the port grouping), and teu throughput.*

Sources *Data provided by shipping lines, Containerisation International (1996).*

BTCE

above the highest rate at an Australian port (23.2 containers per hour at Sydney). In the third group, the rate at La Spezia (23.9 containers per hour) exceeded the highest rate at an Australian port (22.1 containers per hour at Sydney).

Delay time in port

Delay time is defined as the time waiting to berth, plus the time at berth that the ship is waiting for labour or equipment to arrive, plus any delays in departing the berth when work has been completed.

Table 7 shows that ship delay time was generally lower at the European ports. Average delay time at the European ports in the first group (1.9 hours) was well below average delay time at the Australian ports (8.5 hours). In the second group of ports, average delay time at Felixstowe (0.6 hours) was well below the lowest figure at an Australian port (3.4 hours at Melbourne). In the third group, average delay time at La Spezia (3.7 hours) was also well below the lowest figure at an Australian port (6.6 hours at Melbourne). Additional data provided by one line indicated that Adelaide had a lower average delay time for its ships than La Spezia and Tilbury.

Further information on delay time provided by a line operating Australia–Europe services via Singapore also indicated that delays at European ports were relatively low. Average delay time for the line's ships at eight European ports (including Felixstowe, Hamburg and Rotterdam) ranged from 1.0 to 2.5 hours, with an average of 1.3 hours. The delays at Sydney, Melbourne and Fremantle ranged between 6.2 and 10.0 hours, with an average of 8.1 hours.

Shipping lines indicated that a major cause of high delay times at Australian ports is the unpredictability of ship working rates. This unpredictability often prevents ships from keeping to scheduled arrival and departure times at individual ports, with consequent delays to other ships. In addition, the lines stated that there are inadequate numbers of cranes in some ports. They also commented that inflexible work and management practices cause delays because labour is often not available when required. By comparison, flexible work practices in Europe (eg split shifts) facilitate continuous working of ships and thereby minimise delays.

Current initiatives that will potentially reduce delay times and increase productivity at individual Australian ports include the upgrading and expansion of terminal equipment (particularly at Melbourne and Fremantle), the introduction of more flexible rostering arrangements at some terminals, and consolidation of the terminals at Fremantle. Some shipping lines commented that productivity at Melbourne had recently increased.

Concluding comments

The data provided by the shipping lines indicate that the European container ports had higher crane productivity and, in most cases, higher crane intensity than the Australian container ports in 1995. These factors resulted in higher ship handling rates at the European ports. In almost all cases, ship delay time was lower at the European ports.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ACCC	Australian Competition and Consumer Commission
BIE	Bureau of Industry Economics
CTAL	Container Terminals Australia Limited
GRT	Gross Registered Tonnage
LOA	Length Overall
NRT	Net Registered Tonnage
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time the ship is alongside the berth offering for work whether worked or not, measured from labour first ordered to last labour ashore.

Elapsed rate—the number of teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at the ship operator's request.

Net rate—the number of teus moved per net hour.

Crane rate—the number of teus moved per crane per net hour.

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TABLE 8 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, SEPTEMBER QUARTER 1991–MARCH QUARTER 1996

Port	Sep–91	Dec–91	Mar–92	Jun–92	Sep–92	.....	Sep–93	Dec–93	Mar–94	Jun–94	Sep–94	Dec–94	Mar–95	Jun–95	Sep–95	Dec–95	Mar–96	Past four quarters
Brisbane																		
Ships handled	91	91	85	96	93	na	106	111	112	140	140	187	136	123	135	132	124	514
Total teus	38074	36021	28235	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	35833	188188
Crane rate	14.3	14.9	17.0	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6[r]	18.9	20.0	18.8
Elapsed rate	16.9	17.8	19.6	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5[r]	21.0	21.3	20.0
Net rate	18.2	19.6	21.1	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5[r]	24.6	24.4	23.2
Sydney																		
Ships handled	109	109	105	109	112	na	205	238	177	240	223	221	218	202	192	203	206	803
Total teus	67601	72250	71702	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	127726	560016
Crane rate	15.5	17.5	18.6	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.8	18.9
Elapsed rate	16.5	18.4	19.9	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.5	22.3
Net rate	18.4	22.7	26.3	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	27.5	27.4
Melbourne																		
Ships handled	113	125	108	121	121	na	235	306	211	265	267	244	265	228	221	227	228	904
Total teus	75427	95019	73441	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	152440	640932
Crane rate	15.7	14.8	16.7	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4[r]	19.8	19.6	20.5	19.8
Elapsed rate	17.6	18.7	19.2	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	23.7
Net rate	20.9	20.5	22.1	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	26.8
Adelaide																		
Ships handled	20	21	22	20	21	na	21	26	28	34	31	33	35	50	34	42	47	173
Total teus	9442	10998	10810	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	69268
Crane rate	17.0	18.0	19.8	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.0
Elapsed rate	19.6	25.3	27.2	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	25.6
Net rate	20.5	25.9	28.2	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.5
Fremantle																		
Ships handled	76	77	71	75	72	na	116	115	127	135	121	124	128	136	139	124	143	542
Total teus	22713	26522	25403	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	41916	181936
Crane rate	15.0	16.4	21.0	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	19.8
Elapsed rate	12.1	13.1	16.8	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8[r]	18.5	16.8
Net rate	15.8	16.4	21.0	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	20.9
Five Ports																		
Ships handled	409	423	391	421	419	na	683	796	745	814	782	809	782	739	721	728	748	2936
Total teus	213257	240810	209591	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	373870	1640340
Crane rate	15.4	15.9	18.0	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	19.5
Elapsed rate	16.4	17.8	19.4	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5[r]	21.7[r]	23.2	22.2
Net rate	18.9	20.6	23.3	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5[r]	25.3	26.9	25.9

na Not available.

r Revised by stevedoring companies.

Notes 1. To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This factor lowers the relative magnitude of the figures for the earlier period.

2. Indicators are for all quay crane operations on cellular ships calling at the container terminals.

3. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, Conaust and SeaLand.

WATERLINE

SEPTEMBER 1996 ISSUE NO. 8

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This issue of *Waterline* includes the regular articles on stevedoring performance, port interface costs and port performance. A feature article provides an overview of the non-containerised general cargo sector.

The Bureau is currently developing indicators of waterfront reliability for regular inclusion in future issues of *Waterline*. A workshop with major industry participants in July provided a solid basis for the work in this area.

Stephen Hunter
Director

IN BRIEF

Stevedoring performance

Overall productivity at Australia's major container terminals declined in the June quarter.

The five port average crane rate was 20.1 teus per hour, down from 20.3 teus per hour in the March quarter. The net rate fell marginally to 26.8 teus per hour (from 26.9 teus per hour). The elapsed rate declined to 22.0 teus per hour (from 23.2 teus per hour).

Crane rates declined at Melbourne (19.6 teus per hour) and Brisbane (19.9 teus per hour), and increased at Sydney (20.3 teus per hour). They were unchanged at Adelaide (21.5 teus per hour) and Fremantle (21.2 teus per hour).

Net rates fell at Brisbane, Melbourne and Adelaide. They increased at Sydney and Fremantle. Elapsed rates fell at all ports except Fremantle (increase) and Melbourne (no change).

Average crane intensity at the five ports was 1.35 in the June quarter. The average proportion of elapsed time not worked increased to 17.7 per cent (from 13.8 per cent).

Port Interface Cost Index

Between July–December 1995 and January–June 1996, the national Port Interface Cost Index declined by 1.0 per cent for an import teu and by 0.5 per cent for an export teu. In real terms, the declines were 2.3 per cent for imports and 1.8 per cent for exports.

Several factors contributed to the changes in the national index. Ship-based charges per teu rose in all ports as a result of reductions in average teu exchanges. Customs brokers' fees declined in three ports. Road transport charges fell in two ports and increased in one port.

Port performance

The total tonnage of cargo handled at the five mainland capital city ports increased by 9.6 per cent in January–June 1996 compared with the previous half-year. Container traffic (teus) was virtually unchanged over this period (table 6).

Employment at the four port authorities for which comparable data are available fell by 1.7 per cent in the January–June period. The median and 95th percentile turnaround times for container ships declined at all of the ports.

Non-containerised general cargo

Around 12.4 million tonnes of non-containerised general cargo were handled at Australian ports in 1994/95. Non-containerised cargo accounted for 22 per cent of Australia's overseas general cargo and 51 per cent of coastal general cargo.

There were significant improvements in stevedoring productivity for non-containerised general cargo during the WIRA process. The limited data that are available indicate that the upward trend has not continued across this sector of the waterfront in the post-WIRA period.

STEVEDORING PERFORMANCE INDICATORS

Figures 1 to 6 provide information on stevedoring performance at Australia's major container terminals over the period to the end of the June quarter 1996. Time series data on container terminal performance from the *Waterline* database are contained in table 9.

The stevedoring performance data for Brisbane, Sydney, Melbourne and Fremantle are averages for the terminals operated by P&O Ports and Patrick at each port. The Adelaide data cover the SeaLand terminal.

The information on stevedoring productivity in figures 1 to 6 and table 9 is expressed in teus per hour. Table 1 presents the data for the last three quarters in terms of containers per hour.

Five port average

Overall productivity at Australia's major container terminals declined in the June quarter 1996. The five port average figures particularly reflect changes in performance at Melbourne and Sydney, as the averages are weighted by teu throughput at each port.

The five port average crane rate (productivity per crane while the ship is worked) was 20.1 teus per hour in the June quarter, down from 20.3 teus per hour in the previous quarter (figure 1).

The five port average net rate (total productivity while the ship is worked) fell marginally to 26.8 teus per hour in the June quarter from 26.9 teus per hour in the March quarter. Average crane intensity was 1.35, compared with 1.32 in the previous quarter.

The five port average elapsed rate (productivity based on the time the ship is available to be worked) was 22.0 teus per hour in the June quarter, down from 23.2 teus per hour in the March quarter. On a per crane basis the figure fell to 16.3 teus per hour, from 17.5 teus per hour in the previous quarter.

The five port average figure for the proportion of elapsed time not worked was 17.7 per cent in the June quarter. This was above the March quarter figure of 13.8 per cent.

Brisbane

Stevedoring performance in Brisbane declined slightly during the June quarter (figure 2).

The crane rate was 19.9 teus per hour, down marginally from 20.0 teus per hour in the previous quarter.

The net rate fell marginally to 24.3 teus per hour in the June quarter from 24.4 teus per hour in the March quarter. Average crane intensity was unchanged at 1.22.

Brisbane's elapsed rate was 20.5 teus per hour in the June quarter, down from 21.3 teus per hour in the March quarter. On a per crane basis, the figure fell to 16.8 teus per hour from 17.5 teus per hour in the previous quarter.

The average proportion of elapsed time not worked in Brisbane was 15.8 per cent in the June quarter, up from 12.6 per cent in the March quarter.

Sydney

Sydney's crane rate and net rate improved in the June quarter but there was a decline in the elapsed rate (figure 3).

The crane rate was 20.3 teus per hour, up from 19.8 teus per hour in the previous quarter.

The net rate in Sydney increased to 27.7 teus per hour in the June quarter from 27.5 teus per hour in the March quarter. Average crane intensity was 1.41 compared with 1.39 in the previous quarter.

Sydney's elapsed rate was 20.2 teus per hour in the June quarter, down from 23.5 teus per hour in the March quarter. On a per crane basis, the figure was 14.3 teus per hour compared with 16.9 teus per hour in the previous quarter.The decline in the elapsed rate, despite an increase in the net rate, reflected a rise in the proportion of time not worked. The average proportion of elapsed time not worked in Sydney was 27.1 per cent in the June quarter, up from 14.5 per cent in the March quarter. The June quarter proportion was the highest figure at the port since the June quarter 1994.

Melbourne

In Melbourne, the crane rate and the net rate declined in the June quarter. The elapsed rate was unchanged (figure 4).

The crane rate was 19.6 teus per hour, down from 20.5 teus per hour in the previous quarter.

The net rate declined to 27.6 teus per hour in the June quarter from 28.3 teus per hour in the March quarter. Average crane intensity was 1.41 compared with 1.38 in the previous quarter.

Melbourne's elapsed rate was 24.4 teus per hour in the June quarter, the same as the March quarter figure. On a per crane basis, there was a decline to 17.3 teus per hour from 17.7 teus per hour in the previous quarter.

The average proportion of elapsed time not worked was 11.7 per cent in the June quarter, down from 13.9 per cent in the March quarter.

Adelaide

Adelaide's crane rate was unchanged at 21.5 teus per hour in the June quarter (figure 5). There were declines in the net rate and the elapsed rate.

The net rate fell to 26.7 teus per hour in the June quarter from 27.2 teus per hour in the March quarter. This reflected a decline in average crane intensity to 1.24, from 1.27 in the previous quarter.

Adelaide's elapsed rate was 26.1 teus per hour in the June quarter, down from 26.6 teus per hour in the March quarter. On a per crane basis, the figure was unchanged at 21.0 teus per hour.

Adelaide continued to have a very low proportion of time not worked. The average proportion of elapsed time not worked was 2.2 per cent in the June quarter, the same as the March quarter figure.

Fremantle

Fremantle's crane rate was unchanged at 21.2 teus per hour in the June quarter (figure 6). There were increases in the net rate and the elapsed rate.

The net rate rose to 23.8 teus per hour in the June quarter from 22.2 teus per hour in the March quarter. This reflected an increase in average crane intensity to 1.15, from 1.05 in the previous quarter.

Fremantle's elapsed rate was 19.1 teus per hour in the June quarter, up from 18.5 teus per hour in the March quarter. On a per crane basis the figure fell to 16.6 teus per hour, from 17.6 teus per hour in the previous quarter.

The average proportion of elapsed time not worked in Fremantle was 20.0 per cent in the June quarter, up from 17.1 per cent in the March quarter.

Containers per hour

Waterline has traditionally reported stevedoring indicators on the basis of teus per hour as this format provides continuity with the earlier data published by WIRA. For the purposes of these indicators, a 40 foot container is classified as two teus.

Issue 7 of *Waterline* provided the first set of stevedoring indicators based on the number of containers per hour. These indicators are particularly useful for analysing performance where there is significant variation in the mix of 20 foot and 40 foot containers. Such variations may occur between ports (for example, in international comparisons) and in individual ports over time.

Table 1 presents the major indicators of stevedoring performance in containers per hour for the last three quarters. It covers the same cellular ship calls as the teu data in table 9.

Since the proportion of 40 foot containers at a port may vary between quarters, the trend for a productivity indicator is sometimes affected by the measurement basis (ie teus or containers). At this stage, the *Waterline* commentary will continue to focus on the teu data as this information is more extensive, dating back to 1989. As the time covered by the container data accumulates, there will be more analysis of these data.

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TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS, DECEMBER QUARTER 1995—JUNE QUARTER 1996

(containers per hour)

	Quarter		
Port / indicator	**Dec 1995**	**Mar 1996**	**Jun 1996**
Brisbane			
Crane rate	15.8	17.6	16.7
Elapsed rate	17.0	18.8	17.2
Net rate	20.6	21.5	20.4
Sydney			
Crane rate	15.0	15.8	16.3
Elapsed rate	17.6	18.7	16.4
Net rate	21.0	21.9	22.4
Melbourne			
Crane rate	16.3	17.0	16.2
Elapsed rate	18.8	20.2	20.0
Net rate	21.9	23.4	22.5
Adelaide			
Crane rate	18.8	18.9	18.2
Elapsed rate	22.8	23.3	22.0
Net rate	23.3	23.8	22.5
Fremantle			
Crane rate	16.2	17.9	17.9
Elapsed rate	13.4	15.7	16.3
Net rate	16.7	18.9	20.3
Five ports			
Crane rate	15.9	16.9	16.6
Elapsed rate	17.7	19.3	18.2
Net rate	20.9	22.3	22.0

Sources *Patrick, P&O Ports and SeaLand.*

BTCE

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS

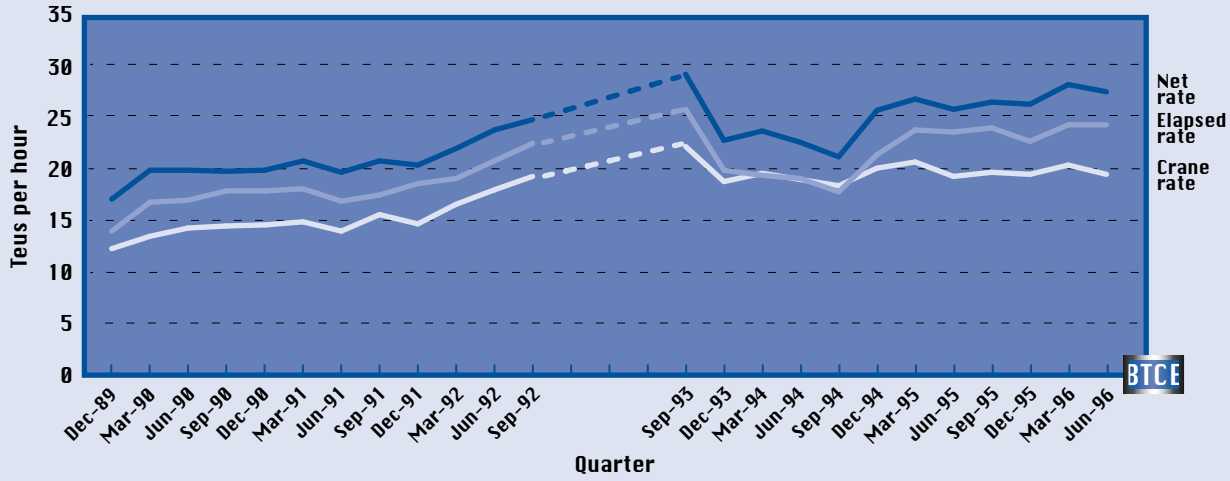


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS

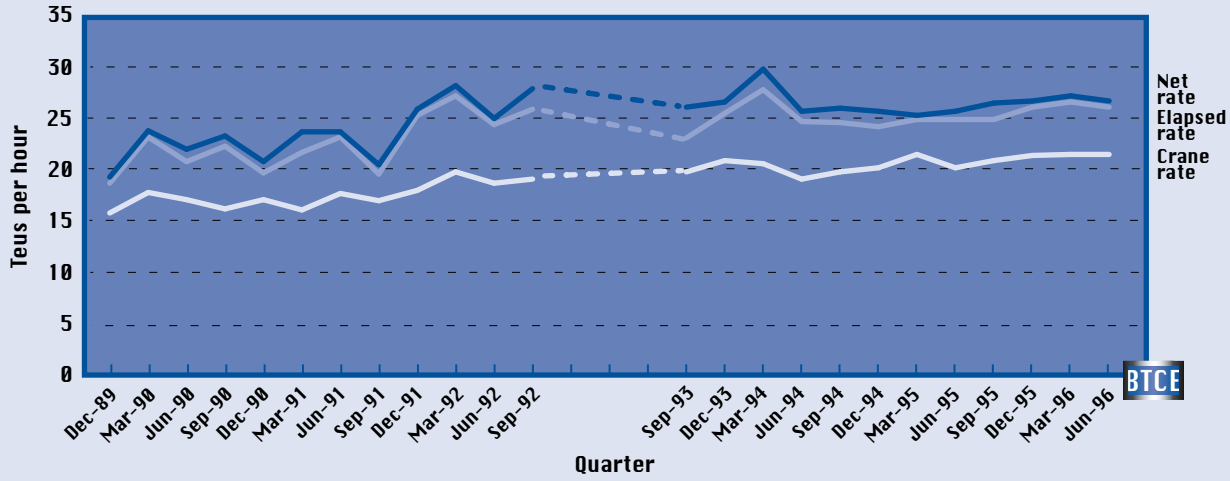
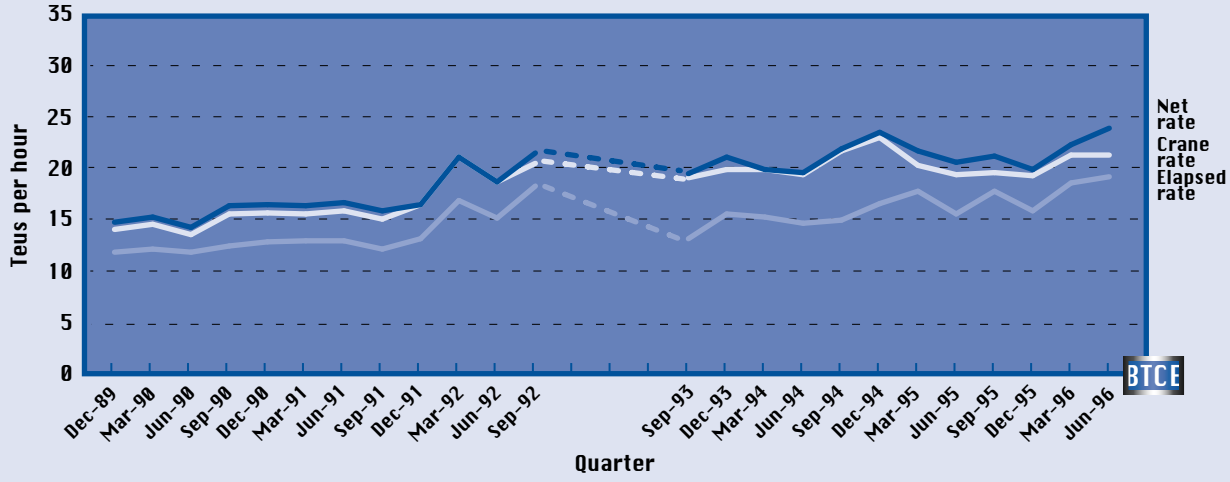


FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS

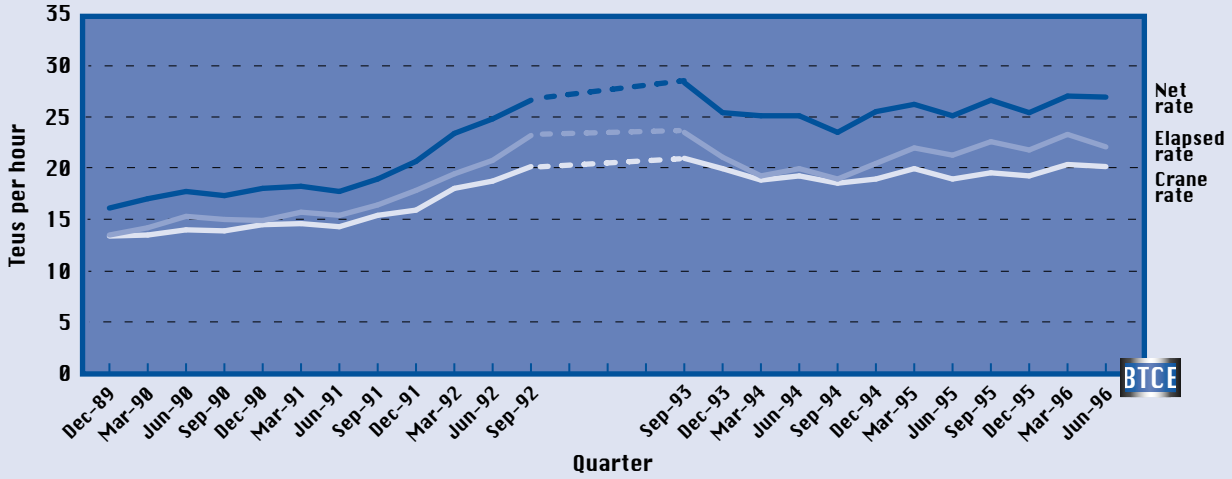


FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS

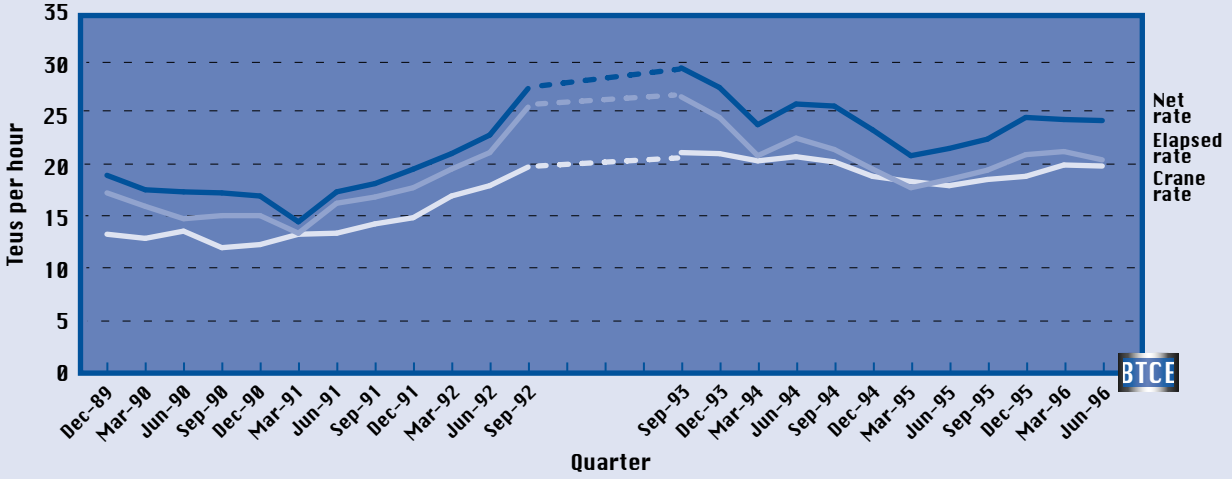
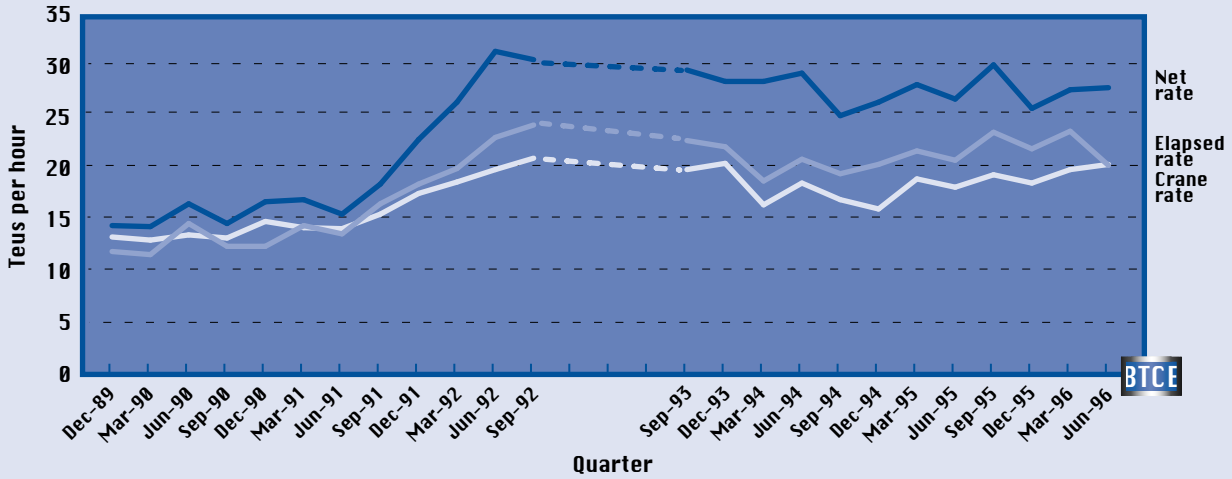


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs for containers moved through Australia's mainland capital city ports. It incorporates the charges of various providers of waterfront-related services. These charges represent costs to shipping lines and shippers.

With the assistance of the AAPMA and the port authorities, the time between the end of the reporting period and publication of the index in *Waterline* has now been reduced to one quarter. This issue of *Waterline* presents data for the January–June 1996 period. The next index, covering July–December 1996, will be published in the March 1997 issue.

The Port Interface Cost Index is calculated for individual ports and on a national basis. It is based on several cost parameters. The major components of the index are port and related charges, stevedoring charges and land-based charges.

Cost parameters

The representative ship used to calculate port and related charges for January–June 1996 was unchanged from the ship used in the previous period (table 2).

The average number of teus exchanged per port call declined at all ports in January–June 1996 compared with July–December 1995. The average exchange for ships in the representative range fell by 12.5 per cent in Brisbane, 11.8 per cent in Sydney, 17.2 per cent in Melbourne, 28.7 per cent in Adelaide and 17.4 per cent in Fremantle.

Port and related charges per ship visit

The port and related charges in the Port Interface Cost Index comprise ship-based and cargo-based components. The ship-based charges are State government, tonnage, pilotage, towage, mooring/unmooring and berth hire charges. The cargo-based charges are wharfage, harbour dues and berthing charges.

The last two rows in table 3 provide information on total ship-based charges and empty teu charges per ship visit for the representative ship. Information on port and related charges per teu (ie charges per ship visit divided by average teu exchange) is presented in the rest of the table.

Table 3 indicates that total ship-based charges *per ship visit* were unchanged in Brisbane, Sydney and Fremantle between July–December 1995 and January–June 1996. Charges per ship visit declined in the other two ports. In Melbourne, the decline reflected a reduction in the tonnage (channel use) charge from $0.59 per tonne to $0.40 per tonne and a reduction in (time-based) berth hire charges due to lower average berth time. In Adelaide, total ship-based charges per ship visit declined as a result of lower average State government charges per ship visit (due to a higher average number of port calls during the period) and lower tonnage charges (due to lower average berth time).

The tonnage charge in Sydney was reduced by 10.9 per cent from 1 July 1996. This reduction will be incorporated in the next Port Interface Cost Index, covering July–December 1996, which will be reported in the March 1997 issue of *Waterline*.

Table 3 indicates that, for an operator of a vessel similar in size to the representative ship, Fremantle ($17 902) had the lowest total ship-based charges per ship visit in January–June 1996. It was followed by Brisbane ($19 840) and Adelaide ($19 853).

Port and related charges per teu

The level of *ship-based charges per teu* provides an indication of the impact of ship-based charges on shippers. This measure is affected by the total charges per ship visit and by the number of teus exchanged per visit. With a given level of charges per ship visit, a reduction in the number of teus exchanged will result in a higher charge per teu to bring the ship into the port. Conversely, an increase in the average exchange will reduce the cost per teu with a given level of charges per ship visit.

Ship-based charges per teu increased at all of the ports in January–June 1996 compared with the previous period. The changes were 14.3 per cent in Brisbane, 13.4 per cent in Sydney, 2.9 per cent in Melbourne, 35.0 per cent in Adelaide and 21.1 per cent in Fremantle. These increases resulted from the significant reductions in average teu exchanges. The decline in tonnage and (time-related) berth hire charges per ship visit at Melbourne limited the rise in ship-based charges per teu at that port to a relatively small amount.

Cargo-based charges for loaded containers were unchanged at all ports in the January–June period. A 60 per cent reduction in Sydney's wharfage on empty containers (from $25 to $10 per teu) was announced in June 1996 but did not take effect until the July–December period. Similarly, a 20 per cent reduction in Melbourne's wharfage on loaded and empty containers (eg from $46.75 per teu to $37.40 per teu for direct cargo) took effect from 1 July 1996. Both of these reductions will be incorporated in the next Port Interface Cost Index, covering July–December 1996, which will be published in the March 1997 issue of *Waterline*.

Overall, there were significant increases in *port and related charges per teu* (ship-based charges plus cargo-based charges) in the five ports during the first half of 1996. On a teu basis, port and related charges for loaded export containers rose by 6.1 per cent in Brisbane, 5.2 per cent in Sydney, 1.4 per cent in Melbourne, 18.3 per cent in Adelaide and 9.5 per cent in Fremantle.

Stevedoring charges per teu

The stevedoring charges used in this issue of *Waterline* are preliminary figures obtained from the Australian Competition and Consumer Commission (ACCC). The final figures will be published in the Commission's next report on stevedoring costs and terminal handling charges.

The preliminary estimates indicate that the national weighted average revenue for the ACCC's sample of container terminal operations was $203 per teu in 1995. The stevedoring charges in table 4 will be updated when the ACCC releases figures for 1996.

Land-based charges per teu

The land-based charges in the Port Interface Cost Index are customs brokers' fees and road transport charges. Changes in these components are detailed in table 4.

The Bureau's survey of customs brokers indicates that, in January–June 1996, fees for import containers declined by $6 per teu in Melbourne and by $4 per teu in Adelaide and Fremantle. Fees for import containers were unchanged in Brisbane and Sydney. For export containers, customs brokers' fees fell by $2 per teu in Melbourne and were unchanged in the other ports.

Road transport charges decreased by $20 per teu in Sydney and by $1 per teu in Melbourne in January–June 1996 compared with the previous period. There was an increase of $13 per teu in Adelaide following a rise in rates paid to contractors. Road transport charges in Brisbane and Fremantle were unchanged.

Indexes for individual ports

Table 4 provides details of the Port Interface Cost Index for individual ports in January–June 1996 and the previous half-year. It indicates that shore-based shipping costs (charges) per teu declined in Sydney and Melbourne. There were increases in Brisbane, Adelaide and Fremantle.

The sources of change in the index for each port between July–December 1995 and January–June 1996 are shown in figure 7. Increases in port and related charges per teu affected the index in all ports, and were the only source of change in Brisbane. Customs brokers' fees contributed to the changes in the index for imports and exports in Melbourne and for imports in Adelaide and Fremantle. Changes in road transport charges had major effects in Sydney and Adelaide, and made a small contribution to the change in the index for Melbourne.

National index

Data on the national Port Interface Cost Index are presented in table 5. In overall terms, the index declined by 1.0 per cent for an import teu and by 0.5 per cent for an export teu over the period. In real terms, the reductions were 2.3 per cent for imports and 1.8 per cent for exports, using the implicit price deflator for gross non-farm product.

The changes in the national index between the July–December and January–June periods reflected higher port and related charges per teu in all ports, lower customs brokers' fees in three ports and changes in road transport charges in three ports. Since the national index is an average (weighted by teu throughput at each port) for the five ports, developments in Sydney (particularly the reduction in road transport charges) and Melbourne have a major impact on the national outcome.

TABLE 2 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1995/96

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
LOA (metres)	-	-	-	-	176	176	-	-	-	-
Teus exchanged[a]										
Total	392	343	848	748	815	675	302	215	340	281
Loaded	302	264	703	620	688	570	235	168	280	231
Empty	90	79	145	128	127	105	67	47	60	50
Loaded inwards	106	92	442	390	-	-	82	59	-	-
Loaded outwards	196	172	261	230	-	-	153	109	-	-
Primary produce	-	-	-	-	-	-	46	33	-	-
Ship call parameters[a]										
Number of port calls	3	3	3	3	3	3	2	3	5	5
Elapsed berth time (hrs)	29	22	49	41	41	33	21	15	29	22

- not required.

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

Sources BTCE estimates based on ship call data supplied by port authorities and other port service providers.

TABLE 3 PORT AND RELATED CHARGES, 1995/96

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996
Ship-based charges ($/teu)										
State government	8.04	9.19	-	-	-	-	5.97	6.98	2.33	2.82
Tonnage	-	-	9.34	10.59	12.46	10.20	13.81	17.18	7.44	9.01
Pilotage	13.08	14.96	4.01	4.55	6.73	8.13	7.78	10.91	6.47	7.83
Towage	25.82	29.52	11.52	13.07	9.02	10.89	40.73	57.12	33.18	40.16
Mooring & unmooring	3.68	4.20	3.71	4.21	3.50	4.22	-	-	3.24	3.92
Berth hire[a]	-	-	-	-	12.08	11.61	-	-	-	-
Total[b]	50.61	57.87	28.59	32.41	43.79	45.05	68.29	92.19	52.65	63.74
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	46.75	46.75	65.00	65.00	49.79	49.79
Exports	26.00	26.00	45.00	45.00	46.75	46.75	62.00	62.00	49.79	49.79
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berthing	-	-	-	-	-	-	-	-	14.63	14.63
Total port and related charges ($/teu)										
Loaded imports	118.61	125.87	88.59	92.41	90.54	91.80	133.29	157.19	117.07	128.16
Loaded exports	118.61	125.87	73.59	77.41	90.54	91.80	130.29	154.19	117.07	128.16
Charges per ship visit ($/visit)										
Total ship-based charges	19840	19840	24241	24241	35689	30411	20625	19853	17902	17902
Empty teus[c]	1283	1126	3625	3200	1727	1428	0	0	486	405

- not applicable.

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

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

c. Sum of wharfage, harbour dues and berthing charges per empty teu, multiplied by average exchange of empty teus.

Note Port and related charges are based on the parameters described in table 2.

Sources BTCE estimates based on ship call data supplied by port authorities, and price schedules of port authorities, towage operators and pilotage service providers.

TABLE 4 PORT INTERFACE COSTS, 1995/96

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1995	Jan–Jun 1996
Imports										
Ship-based charges	51	58	29	32	44	45	68	92	53	64
Cargo-based charges	68	68	60	60	47	47	65	65	64	64
Stevedoring[p]	203	203	203	203	203	203	203	203	203	203
Customs brokers' fees	121	121	153	153	144	138	139	135	139	135
Road transport charges	175	175	310	290	247	246	142	155	185	185
Total imports[a]	618	625	755	739	685	679	618	650	644	651
Exports										
Ship-based charges	51	58	29	32	44	45	68	92	53	64
Cargo-based charges	68	68	45	45	47	47	62	62	64	64
Stevedoring[p]	203	203	203	203	203	203	203	203	203	203
Customs brokers' fees	79	79	108	108	91	89	71	71	71	71
Road transport charges	175	175	310	290	247	246	142	155	185	185
Total exports[a]	575	582	694	678	631	630	547	583	576	588

p Preliminary estimate.

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

Note Based on parameters described in table 2.

Sources BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charges data supplied by ACCC.

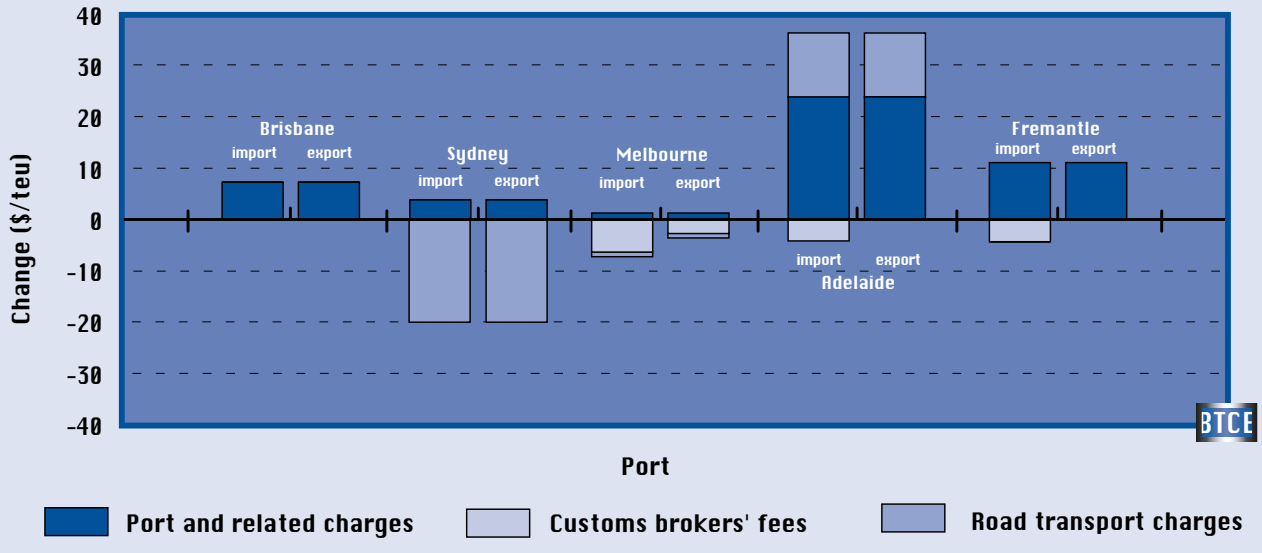
TABLE 5 THE NATIONAL PORT INTERFACE COST INDEX

($/teu)

	Jul-Dec 1992	Jan-Jun 1993	Jul-Dec 1993	Jan-Jun 1994	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1995	Jan-Jun 1996
Imports	696	675	670	690	684	697	696	689
Exports	617	608	612	633	624	633	636	633

Sources BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charges data supplied by ACCC.

FIGURE 7 SOURCES OF CHANGES IN PORT INTERFACE COSTS FOR INDIVIDUAL PORTS, JULY–DECEMBER 1995 TO JANUARY–JUNE 1996



Sources BTCE estimates based on: ship call data supplied by port authorities; price schedules of port authorities, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charges data supplied by ACCC.

PORT PERFORMANCE

Information on aspects of non-financial performance for the five mainland capital city ports and their port authorities during 1995/96 is presented in table 6. The time between the end of the reporting period and publication of the data in *Waterline* has now been reduced to one quarter with the assistance of the AAPMA and the port authorities. The next indicators of non-financial performance, covering July–December 1996, will be published in the March 1997 issue of *Waterline.*

Cargo throughput

Table 6 indicates that *total cargo throughput* (bulk and general cargo) at the five ports increased by 9.6 per cent to 42.8 million tonnes in January–June 1996. The increase relative to the July–December 1995 period reflected higher throughput at all of the ports, with Fremantle accounting for around two-thirds of the increase.

The rise in total cargo throughput in January–June 1996 followed a decline of 3.7 per cent in the previous half-year. Total throughput in January–June 1996 was 5.5 per cent higher than throughput in the corresponding half-year of 1995.

The tonnage of *non-containerised, general cargo* handled at the five ports increased by 3.2 per cent in January–June 1996 compared with the previous half-year. There were increases in cargo at Fremantle, Melbourne and Adelaide.

Container traffic (teus) at the five ports was virtually unchanged in January–June 1996 compared with the July–December 1995 period. Total teus increased at Fremantle (9.1 per cent), Adelaide (6.5 per cent) and Brisbane (4.1 per cent). Traffic declined at Sydney (3.1 per cent) and Melbourne (1.0 per cent). Overall for the five ports, there were increases in empty import teus (20.4 per cent) and full export teus (1.6 per cent), and declines in full import teus (4.0 per cent) and empty export teus (2.0 per cent).

In the financial year 1995/96, a total of 2.1 million teus were exchanged at the five ports. This represented a 4.6 per cent increase on the 1994/95 figure.

The data in table 6 cover all containers handled at the five mainland capital city ports. They include movements at all terminals and multi-purpose berths, whether by lifting or by movement across the ramps of roll-on/roll-off ships. Table 6 therefore provides a more comprehensive measure of container traffic than table 9 which only includes containers lifted on and off fully cellular ships at major container terminals in the five ports.

Employment

Table 6 includes data on port authority employment at the five ports. Comparable data for the July–December 1995 and January–June 1996 periods are available for only four of the ports, as there was substantial restructuring of port operations in Melbourne during the January–June period.

Total employment at the other port authorities (Brisbane, Sydney, Adelaide and Fremantle) fell by 16 (1.7 per cent) in January–June 1996 compared with the July–December 1995 period. A fall of almost 7 per cent at Adelaide was the largest single change during the period.

Ship turnaround time

The median turnaround time for ships calling *at container terminals* declined in all of the ports in January–June 1996 compared with the July–December 1995 period. The reductions in average teu exchanges, noted in the earlier article on the Port Interface Cost Index, would have contributed to these declines.

The indicator of median turnaround time is based on total time in port (usually measured from port boundary to port boundary). It is not directly comparable with the estimated stevedoring time for a 560 teu exchange (based on time between labour first ordered and last labour off the ship) that has also been reported in previous issues of *Waterline.*

In the January–June 1996 period, the 95th percentile ship turnaround time declined significantly in all of the ports. This figure indicates the turnaround time that is equalled or bettered by 95 per cent of ships using a particular port. It provides a partial indicator of the variability of ship turnaround time in each port.

TABLE 6 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1995/96

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five Ports[c]	
Indicator	**Jul-Dec 1995**	**Jan-Jun 1996**	**Jul-Dec 1995**	**Jan-Jun 1996**	**Jul-Dec 1995**	**Jan-Jun 1996**	**Jul-Dec 1995**	**Jan-Jun 1996**	**Jul-Dec 1995**	**Jan-Jun 1996**	**Jul-Dec 1995**	**Jan-Jun 1996**
Total cargo throughput ('000 tonnes)	9214[r]	9575	9884	10268	8830	9025	2268	2616	8874	11330	39071[r]	42815
Non-containerised general cargo ('000 tonnes)[a]	339	332	490	382	900	933	126	133	237	380	2091	2159
Containerised cargo (teus exchanged)												
Full import	37075	39286	178643	167875	202013	193089	10291	9004	42041	41908	470063	451162
Empty import	22435	24942	7583	10170	31168	36082	5155	6030	7883	12165	74224	89389
Full export	54646	55527	109955	107105	185724	186167	16824	19167	38980	44661	406129	412627
Empty export	8037	7491	51574	51809	45015	43884	1317	1567	8048	6994	113991	111745
Total teus	122193	127246	347755	336959	463920	459222	33587	35768	96952	105728	1064407	1064923
Average total employment	228	229	239	243	d	287[e]	230	214	218	213	na	1186
Turnaround time (hrs)[b]												
Median result	33.7	26.8	47.9	39.0	42.7	35.8	26.1	20.2	32.9	28.4	-	-
95th percentile	63.2	48.0	95.2	75.7	104.6	69.6	59.5	48.1	104.5	75.8	-	-

- *not applicable.*

na *not available.*

r *Revised figure.*

a. *Excludes bulk cargoes.*

b. *Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.*

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

d. *Comparable figure is not available for Melbourne in July–December 1995 period due to the subsequent restructuring of the Port of Melbourne Authority.*

e. *Incorporates Melbourne Port Corporation, Melbourne Port Services Pty Ltd and Port of Melbourne Authority (Shell) employees. Victorian Channels Authority employees are not included. Figure is the total as at 30 June 1996, not an average for the six-month period.*

Source *AAPMA.*

NON-CONTAINERISED GENERAL CARGO

The data on stevedoring performance and shore-based shipping costs in *Waterline* concentrate on container traffic. This reflects the high level of containerisation of general (non-bulk) cargo in Australia and the focus of waterfront reform on the container terminals.

While most of the general cargo moved through Australian ports is containerised, significant quantities of general cargo are carried 'loose' or in unitised form. The term 'breakbulk' is often used for this cargo which includes palletised, boxed, coiled and bundled items as well as motor vehicles.

The publicly available information on non-containerised general cargo handled at Australian ports is limited. This article provides an overview of this sector using a range of sources including data provided to the BTCE by stevedores, port authorities, shippers and shipping lines. The data are not as comprehensive or as systematic as the information for containerised cargo that is regularly reported in *Waterline.*

Cargoes

Non-containerised general cargo is broadly defined as all cargo other than bulk cargo (commodities which take the shape of the vessel in which they are held) and cargo in shipping containers. The main types of non-containerised general cargo handled at Australian ports include iron and steel, pine logs, timber, metal ingots, motor vehicles, machinery, paper products and meat.

Many of these cargoes are not well-suited to transport in containers due to their physical characteristics and the weight and/or dimensional restrictions imposed by shipping containers. For certain commodities (eg meat) methods such as palletisation may provide a commercially attractive alternative to containerised transport. In some cases, limited port facilities or transport infrastructure in overseas markets result in a requirement for non-containerised or non-bulk transport (eg sugar or ammonium nitrate in bulker bags).

Table 7 provides information on the tonnages of non-containerised general cargo handled at Australian ports in 1994/95. It indicates that coastal and overseas cargo totalled 12.4 million tonnes in that year.

Around 4.5 million tonnes of coastal non-containerised general cargo was loaded and discharged at Australian ports in 1994/95 (Department of Transport 1995, 7–10). This represented 51 per cent of coastal general cargo in that year. Iron and steel accounted for around 44 per cent of the non-containerised general cargo carried on coastal services.

The remaining 7.9 million tonnes of non-containerised general cargo handled at Australian ports was overseas cargo. This was equivalent to 22 per cent of the 35.3 million tonnes of overseas general cargo handled at Australian ports in 1994/95 (Department of Transport and Regional Development 1995).

Ships

Several types of ships are involved in the transport of non-containerised general cargo.

Conventional cargo vessels are specifically designed to carry diverse forms of dry cargo, and may also carry some containers. Cargo is lifted on and off the ship using cranes or derricks.

Roll-on/roll-off ships are designed to carry motor vehicles and other cargo which can be loaded and unloaded using wheeled transport. These ships carry significant amounts of non-containerised general cargo as well as containers.

There are also several types of specialised ships involved in the carriage of non-containerised general cargo in the overseas trades. They include car carriers, reefer ships equipped to carry palletised meat, specialised forest products carriers and livestock carriers.

Ports

Table 7 indicates that six ports handled almost two-thirds of Australia's non-containerised general cargo in 1994/95. The ports, and the major cargoes handled, were:

- Port Kembla (17.1 per cent), mainly iron and steel;
- Melbourne (15.1 per cent), particularly paper and newsprint, iron and steel, and timber;
- Hastings (11.0 per cent), steel coil and slabs;

- Sydney (8.8 per cent), particularly paper and newsprint, iron and steel, and timber;
- Newcastle (6.7 per cent), mainly iron and steel;
- Burnie (5.9 per cent), particularly pine logs, motor vehicles, timber and particle board.

The five mainland capital city ports regularly covered in *Waterline* accounted for 35.7 per cent of the non-containerised general cargo handled at Australian ports in 1994/95. The *Waterline* data on port non-financial performance indicate that the tonnage of non-containerised general cargo handled at these ports declined by 1.9 per cent between 1993/94 and 1995/96. Declines at Sydney (17.5 per cent) and Adelaide (21.6 per cent) more than offset increases at Brisbane (16.8 per cent), Fremantle (11.2 per cent) and Melbourne (0.9 per cent).

Stevedoring

As non-containerised general cargo includes a diverse collection of commodities, a range of stevedoring techniques is used. The cargo is lifted on and off the ship with cranes or derricks, carried by fork lifts or, in the case of motor vehicles, driven on and off the ship. The stevedoring operation may include the use of hooks, slings, nets, mechanical or magnetic grabs, or vacuum handling equipment. Cargo may be lifted to or from trucks directly under the hook. In some cases, there is significant handling and organisation of the cargo aboard the ship.

The stevedoring of non-containerised general cargo is more labour intensive, and less capital intensive, than container stevedoring (BTCE 1995, 82). Fixed costs account for a smaller proportion of total costs in non-containerised general cargo operations. These characteristics mean that there is scope for small (often specialised) stevedoring companies to operate in this sector of the waterfront. For example, the Strang Group recently announced that it would be participating in a joint venture to operate a forest products facility in Melbourne.

The stevedoring of non-containerised general cargo in Australia is undertaken by various companies, including several shipping lines which service their own ships. The companies with multi-port operations include Patrick (19 ports), P&O Ports (16 ports), BHP Stevedoring (6 ports), Union Stevedoring Services (4 ports), Northern Shipping and Stevedoring (3 ports), Perkins Shipping (2 ports), Brambles Shipping (2 ports) and Victorian Regional Stevedores (2 ports). At least seven other companies provide stevedoring operations in a single port.

Studies of performance

The wide range of non-containerised general cargoes and the variety of ships carrying this cargo make it difficult to monitor performance on a consistent basis over time or between ports. However, some data have been published by the Waterfront Industry Reform Authority (WIRA), the BTCE, the Prices Surveillance Authority (PSA) and the Bureau of Industry Economics (BIE).

The WIRA data indicate that labour productivity for aspects of non-containerised general cargo stevedoring increased between 1989 and 1992 (BTCE 1995, 61–63). Average tonnes handled per person-shift for conventional ships at the five mainland capital city ports increased by 97 per cent for non-reefer cargoes and by 70 per cent for reefer cargoes. The WIRA data also indicate substantial increases in ship working rate productivity for conventional ships over the period.

Systematic data on the performance of non-containerised general cargo stevedoring are not available for the period since 1992. However, on the basis of anecdotal information, the BTCE concluded in 1995 that the substantial average improvements in performance achieved during the WIRA period were being seriously eroded in Sydney and Melbourne (BTCE 1995, 64). It noted that the situation at other ports appeared to be variable.

In 1994, the PSA published some findings on general stevedoring charges for specific types of cargo (including timber, steel and paper) at several Australian ports (PSA 1994, 6–7). It concluded that unit stevedoring costs had declined by an average of 32 per cent between 1991 and 1993, although there had been a marked reduction in the rate of decline from 1992. This finding was based on a limited sample. Anecdotal evidence indicated that other sectors of general stevedoring had not experienced the same rate of productivity growth. The PSA subsequently ceased monitoring general stevedoring charges when industry restructuring and the containerisation of some cargoes reduced the availability of comparable data.

A report published in 1995 by the BIE included information on non-containerised general cargo (BIE 1995, 75–90). The BIE cited benchmarking work undertaken by BHP Transport for a range of commodities including timber, newsprint and steel products. The data indicated that, in late 1994, Australia's non-terminal waterfront charges (ie excluding stevedoring charges) were high by international standards. Stevedoring charges in Australia were consistently higher than the charges at a wide selection of overseas ports, reflecting a combination of low productivity and relatively high wages in Australia.

Other performance data

During the preparation of this article, the BTCE approached a wide range of port authorities, stevedores, shippers and shipping lines for information on non-containerised general cargo. In most cases, the companies were unable to provide consistent data on stevedoring performance due to factors such as the variability of cargo mixes, changes in stevedoring arrangements over time and the absence of systematic records. However, several organisations supplied data for specific ports and commodities.

One company commented on performance at two regional ports. It reported that, compared to the pre-WIRA period, the tonnage of metal products handled per shift at one port had increased by 75 per cent. At the other port, the tonnage of bagged cargo handled per gang shift had increased by 129 per cent. The company noted that these improvements had mainly occurred during the WIRA process and that there had been only limited increases in productivity since 1992.

Further information for the second port was provided by a shipping line. It indicated that, between 1990/91 and 1995/96, tonnes handled per gross gang hour had risen by 49 per cent for random dump stow and by 123 per cent for pre-slung bulker bags.

Some information on landing costs for motor vehicles at Melbourne, Sydney and Brisbane was provided to the BTCE by an industry association. The data indicated that the stevedoring charge per vehicle rose by 9–12 per cent from 1986 to 1990 and then remained unchanged between 1990 and 1995. This was a significant decline in real terms over the latter period.

The industry association also supplied information on the total of wharfage, port service charges (where applicable), harbour dues (where applicable) and stevedoring charges. In Melbourne and Sydney, the total charge per vehicle increased by 33–36 per cent between 1986 and 1990 and then declined by 8–19 per cent over the period to 1995. In Brisbane, the total charge increased by 7 per cent over the initial period and then remained virtually constant.

Anecdotal evidence provided by several shipping lines and shippers indicated considerable variation in stevedoring productivity for non-containerised general cargo. Some lines commented that productivity in Australian ports was satisfactory while others stated that they were experiencing pre-WIRA work practices and attitudes. One company noted that ship loading rates in a particular port varied substantially and that they doubled when the best gangs worked the ship.

Data supplied by a shipping line showed considerable variation in stevedoring productivity and charges for palletised meat at five Australian ports during 1995. Gross loading rates averaged 28 tonnes per hour at the port with the lowest rate, and 52 tonnes per hour at the best-performing port. On a net basis (ie excluding any delays in loading), the rates varied between 40 and 54 tonnes per hour. Average stevedoring delays at the ports ranged from 0.6 hours to 10.8 hours per ship visit. Stevedoring charges at the five ports varied between $21 and $46 per tonne.

Several shipping lines and stevedores identified a lack of management control over wharf labour as the main reason for unsatisfactory stevedoring performance. A major line stated that shipments of non-containerised general cargo had increased substantially in New Zealand following port reform in that country, and that this had benefited regional ports.

BHP Transport provided data on stevedoring productivity and charges for timber and steel at several ports in Australia (discharge) and New Zealand (loading). The data, which are summarised in table 8, cover the operations of a BHP ship over a six-month period in 1996.

Table 8 indicates that stevedoring charges were considerably lower at the New Zealand ports, with the exception of Auckland. Caution should be used in comparing productivity at the New Zealand and Australian ports, as loading of timber and steel coil is more complex than discharge. Despite this factor, stevedoring productivity for timber was higher at the loading ports in New Zealand.

The impact of differences in loading and discharge is particularly significant in the case of steel coil. Loading the coil involves dropping, stowing and securing, as well as the use of forklifts in the ship's holds. To discharge, the coil is lifted straight out of the hold. This is the main reason for the relatively low productivity reported for steel coil at Tauranga compared with the Australian ports.

Table 8 indicates that gang sizes in Australia were generally higher than those in New Zealand. The relatively large gangs in Adelaide reflect the introduction of continuous stevedoring operations in that port.

Concluding comments

Non-containerised cargo accounts for a significant proportion of the general cargo handled at Australian ports. Stevedoring productivity for non-containerised general cargo improved during the WIRA process. Subsequent data cover
a small number of commodities and ports, and do not provide comprehensive information on trends in performance. However, the available data indicate that the upward trend in performance during the WIRA process has not continued across this sector of the waterfront in the post-WIRA period.

TABLE 7 NON-CONTAINERISED GENERAL CARGO HANDLED AT AUSTRALIAN PORTS, 1994/95

Port	'000 Tonnes	Port	'000 Tonnes
Port Kembla	2 125	Geelong	318
Melbourne	1 871	Portland	316
Hastings	1 366	Launceston	208
Sydney	1 093	Gladstone	166
Newcastle	827	Darwin	146
Burnie	733	Cairns	116
Brisbane	574	Hobart	80
Fremantle	565	Rockhampton	53
Whyalla	420	Port Hedland	42
Townsville	366	Geraldton	27
Devonport	335	Other	341
Adelaide	327	**Total**	12 415

Sources *Steering Committee on National Performance Monitoring of GTEs (1996), Department of Transport (1995), port authority annual reports and personal communications.*

TABLE 8 STEVEDORING PRODUCTIVITY AND CHARGES FOR TIMBER AND STEEL AT SELECTED PORTS, 1996

Commodity/port	Lifts per gross gang hour	Tonnes per gross gang hour	Gang size	Stevedoring charge per unit (index)
Timber				
Sydney (D)	5.3	63	8–10	100
Melbourne (D)	4.6	55	8–10	127
Adelaide (D)	5.6	67	14	139
Auckland (L)	7.9	96	6–8	142
Tauranga (L)	6.9	83	5	40
Napier (L)	6.2	75	5	42
Lyttelton (L)	6.0	72	5	82
Steel coil				
Sydney (D)	5.3	84	8–10	100
Melbourne (D)	7.1	114	8–10	120
Adelaide (D)	5.6	90	14	80
Tauranga (L)	4.6	74	7	32

D. *Discharge operation*

L. *Loading operation*

Source *BHP Transport*

TABLE 9 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, DECEMBER QUARTER 1991—JUNE QUARTER 1996

Port	Dec–91	Mar–92	Jun–92	Sep–92	.....	Sep–93	Dec–93	Mar–94	Jun–94	Sep–94	Dec–94	Mar–95	Jun–95	Sep–95	Dec–95	Mar–96	Jun–96	Past four quarters
Brisbane																		
Ships handled	91	85	96	93	na	106	111	112	140	140	187	136	123	135	132	124	133	524
Total teus	36021	28235	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	35833	45172	186295
Crane rate	14.9	17.0	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	19.3
Elapsed rate	17.8	19.6	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.3	20.5	20.6
Net rate	19.6	21.1	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	24.0
Sydney																		
Ships handled	109	105	109	112	na	205	238	177	240	223	221	218	202	192	203	206	216	817
Total teus	72250	71702	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	127726	127995	547898
Crane rate	17.5	18.6	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.8	20.3	19.5
Elapsed rate	18.4	19.9	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.5	20.2	22.2
Net rate	22.7	26.3	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	27.5	27.7	27.7
Melbourne																		
Ships handled	125	108	121	121	na	235	306	211	265	267	244	265	228	221	227	228	262	938
Total teus	95019	73441	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	152440	157966	645915
Crane rate	14.8	16.7	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	19.6	19.9
Elapsed rate	18.7	19.2	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	24.4	23.9
Net rate	20.5	22.1	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	27.6	27.2
Adelaide																		
Ships handled	21	22	20	21	na	21	26	28	34	31	33	35	50	34	42	47	63	186
Total teus	10998	10810	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	66395
Crane rate	18.0	19.8	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	21.3
Elapsed rate	25.3	27.2	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	25.9
Net rate	25.9	28.2	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8
Fremantle																		
Ships handled	77	71	75	72	na	116	115	127	135	121	124	128	136	139	124	143	153	559
Total teus	26522	25403	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	41916	45650	182278
Crane rate	16.4	21.0	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	21.2	20.3
Elapsed rate	13.1	16.8	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.5	19.1	17.8
Net rate	16.4	21.0	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.8	21.7
Five Ports																		
Ships handled	423	391	421	419	na	683	796	745	814	782	809	782	739	721	728	748	827	3024
Total teus	240810	209591	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	373870	395586	1628781
Crane rate	15.9	18.0	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	20.1	19.8
Elapsed rate	17.8	19.4	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.0	22.4
Net rate	20.6	23.3	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	26.9	26.8	26.4

na not available.

Notes 1. To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993.

2. Indicators are for all quay crane operations on cellular ships calling at the container terminals.

3. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BIE	Bureau of Industry Economics
GRT	Gross Registered Tonnage
LOA	Length Overall
NRT	Net Registered Tonnage
PSA	Prices Surveillance Authority
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time
the ship is alongside the berth offering for work whether worked or not, measured from labour first ordered to last labour ashore.

Elapsed rate—the number of teus or containers moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of teus or containers moved per net hour.

Crane rate—the number of teus or containers moved per crane per net hour.

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BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This issue of *Waterline* includes our regular article on stevedoring performance. The feature articles cover waterfront reliability, crew to berth ratios in Australian shipping and port charging.

I would like to take this opportunity to wish our readers a safe and happy Christmas. The next issue of *Waterline* will be published in March 1997.

Stephen Hunter
Director

IN BRIEF

Stevedoring performance

Overall productivity at Australia's major container terminals improved in the September quarter 1996.

The five port average crane rate was 22.3 teus per hour in the September quarter, up from 21.5 teus per hour in the June quarter. The net rate increased to 29.1 teus per hour (from 28.5 teus per hour) and the elapsed rate rose to 23.6 teus per hour (from 22.6 teus per hour).

Crane rates increased at Brisbane (20.4 teus per hour), Sydney (20.6 teus per hour), Melbourne (24.5 teus per hour) and Adelaide (22.7 teus per hour). Net rates and elapsed rates generally rose at these ports. At Fremantle, there were declines in the crane rate (20.8 teus per hour), the net rate and the elapsed rate.

As quarterly variations in the proportion of traffic comprising 40 foot containers may affect teu-based indicators, *Waterline* also includes indicators expressed in containers per hour. In the September quarter, crane rates increased at Melbourne (19.6 containers per hour) and Adelaide (19.3 containers per hour), and declined at Brisbane (16.5 containers per hour) and Fremantle (17.8 containers per hour). There was no change at Sydney (16.3 containers per hour).

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Waterfront reliability

The BTCE, in consultation with major industry participants, has identified a set of indicators of waterfront reliability for container traffic. The indicators cover ship arrival, berth availability, pilotage, towage, linesmen, cargo availability and stevedoring. It is envisaged that the first data will be published in the March 1997 issue of *Waterline*.

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Crew to berth ratios

The shipping industry reform process in Australia has included targets for reductions in the crew to berth ratios for merchant and offshore shipping. Data collected by the BTCE indicate that these reform targets have not been achieved over the period of the monitoring process. Crew to berth ratios have increased for both merchant shipping (since the September quarter 1993) and offshore shipping (since the March quarter 1995).

page seven

Port charging structures and terminologies

There is significant variation in the structures of port and related charges at Australia's six largest container ports. The terminologies for some charges also differ between ports. These variations reflect responses to local factors and differences in port authority / corporation objectives and pricing strategies.

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Index of articles

This issue contains an index of the articles which have appeared in *Waterline* since the first issue was published in July 1994.

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STEVEDORING PERFORMANCE

Figures 1 to 6 provide information on stevedoring performance at Australia's major container terminals over the period to the end of the September quarter 1996. Time series data on container terminal performance from the *Waterline* database are contained in table 6 (page 15).

The stevedoring performance data for Brisbane, Sydney, Melbourne and Fremantle are averages for the terminals operated by P&O Ports and Patrick at each port. The Adelaide data cover the SeaLand terminal.

The information on stevedoring productivity in figures 1 to 6 and table 6 is expressed in teus per hour. Table 1 presents the data for the last four quarters in terms of containers per hour. The June quarter figures for several ports (and therefore the five port averages) have been revised following the receipt of amended data from one of the terminal operators. These changes are identified in tables 1 and 6.

Five port average

Overall productivity (in teus per hour) at Australia's major container terminals increased in the September quarter 1996. There were improvements in productivity at Brisbane, Sydney, Melbourne and Adelaide.

The five port average *crane rate* (productivity per crane while the ship is worked) was 22.3 teus per hour in the September quarter, up from 21.5 teus per hour (revised) in the June quarter (figure 1).

The five port average *net rate* (total productivity while the ship is worked) rose to 29.1 teus per hour in the September quarter from 28.5 teus per hour (revised) in the June quarter. Average crane intensity (the average number of cranes used to work the ship) was 1.32, compared with 1.34 (revised) in the previous quarter.

The five port average *elapsed rate* (productivity based on the time the ship is available to be worked) was 23.6 teus per hour in the September quarter, up from 22.6 teus per hour (revised) in the June quarter. On a per crane basis the figure rose to 17.9 teus per hour, from 16.9 teus per hour (revised) in the previous quarter.

The five port average figure for the proportion of elapsed time not worked was 19.0 per cent in the September quarter. This was below the June quarter figure of 20.4 per cent (revised).

Brisbane

Stevedoring performance at Brisbane improved in the September quarter (figure 2).

The crane rate was 20.4 teus per hour, up from 19.9 teus per hour in the previous quarter.

The net rate rose to 25.1 teus per hour in the September quarter from 24.3 teus per hour in the June quarter. Average crane intensity was 1.24 compared with 1.22 in the previous quarter.

Brisbane's elapsed rate was 21.3 teus per hour in the September quarter, up from 20.5 teus per hour in the June quarter. On a per crane basis the figure increased to 17.2 teus per hour, from 16.8 teus per hour in the previous quarter.

The average proportion of elapsed time not worked at Brisbane was 15.1 per cent in the September quarter, compared with 15.8 per cent in the June quarter.

Sydney

Sydney's stevedoring performance improved in the September quarter (figure 3).

The crane rate was 20.6 teus per hour, up from 20.3 teus per hour in the previous quarter.

The net rate at Sydney increased to 29.5 teus per hour in the September quarter from 27.7 teus per hour in the June quarter. Average crane intensity was 1.46 compared with 1.41 in the previous quarter.

Sydney's elapsed rate was 23.1 teus per hour in the September quarter, up from 21.8 teus per hour (revised) in the June quarter. On a per crane basis the figure increased to 15.8 teus per hour, from 15.5 teus per hour (revised) in the previous quarter.

The average proportion of elapsed time not worked at Sydney was 21.6 per cent in the September quarter, similar to the June quarter figure of 21.3 per cent (revised).

Melbourne

At Melbourne, there was an improvement in stevedoring performance in the September quarter (figure 4).

The crane rate was 24.5 teus per hour, up from 22.3 teus per hour (revised) in the previous quarter.

The net rate was 31.9 teus per hour in the September quarter, the same as the revised figure for the June quarter. Average crane intensity was 1.31 compared with 1.43 (revised) in the previous quarter.

Melbourne's elapsed rate was 26.3 teus per hour in the September quarter, up from 25.0 teus per hour (revised) in the June quarter. On a per crane basis, there was an increase to 20.1 teus per hour from 17.5 teus per hour (revised) in the previous quarter.

The average proportion of elapsed time not worked at Melbourne was 17.6 per cent in the September quarter, down from 21.5 per cent (revised) in the June quarter.

Adelaide

Adelaide's stevedoring performance improved in the September quarter (figure 5).

The crane rate increased to 22.7 teus per hour, from 21.5 teus per hour in the previous quarter.

The net rate rose marginally to 26.8 teus per hour in the September quarter from 26.7 teus per hour in the June quarter. A decline in average crane intensity to 1.18, from 1.24 in the previous quarter, partly offset the impact of the higher crane rate.

Adelaide's elapsed rate was 26.2 teus per hour in the September quarter, up marginally from 26.1 teus per hour in the June quarter. On a per crane basis, the figure was 22.2 teus per hour compared with 21.0 teus per hour in the previous quarter.

Adelaide continued to have a very low proportion of time not worked. The average proportion of elapsed time not worked was 2.2 per cent in the September quarter, the same as the June quarter figure.

Fremantle

Stevedoring performance at Fremantle declined in the September quarter (figure 6).

Fremantle's crane rate was 20.8 teus per hour, down from 23.4 teus per hour (revised) in the previous quarter.

The net rate fell to 22.9 teus per hour in the September quarter from 23.5 teus per hour (revised) in the June quarter. Average crane intensity was 1.10 compared with 1.00 (revised) in the previous quarter.

Fremantle's elapsed rate was 16.0 teus per hour in the September quarter, down from 17.4 teus per hour (revised) in the June quarter. On a per crane basis the figure fell to 14.6 teus per hour, from 17.4 teus per hour (revised) in the previous quarter.

The average proportion of elapsed time not worked at Fremantle was 30.0 per cent in the September quarter, up from 25.8 per cent (revised) in the June quarter.

Containers per hour

Waterline has traditionally reported stevedoring indicators on the basis of teus per hour as this format provides continuity with the earlier data published by WIRA. For the purposes of these indicators, a 40 foot container is classified as two teus.

Quarterly (and longer-term) variations in the proportion of traffic comprising 40 foot containers may affect teu-based indicators of stevedoring performance. *Waterline* therefore includes stevedoring indicators expressed in containers per hour.

Table 1 presents these indicators for the last four quarters. It covers the same ship calls as the teu data in table 6. In the September quarter, the proportion of traffic comprising 40 foot containers increased at three ports (Brisbane, Sydney and Melbourne) and declined at two ports (Adelaide and Fremantle).

The five port average crane rate increased to 18.0 containers per hour in the September quarter from 17.7 containers per hour (revised) in the June quarter. There were also increases in the net rate and the elapsed rate.

Crane rates increased at Melbourne (19.6 containers per hour) and Adelaide (19.3 containers per hour) in the September quarter. The crane rate at Sydney (16.3 containers per hour) was unchanged. There were declines in crane rates at Brisbane (16.5 containers per hour) and Fremantle (17.8 containers per hour).

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS, DECEMBER QUARTER 1995–SEPTEMBER QUARTER 1996

(containers per hour)

	Quarter			
Port/indicator	**Dec 1995**	**Mar 1996**	**Jun 1996**	**Sep 1996**
Brisbane				
Crane rate	15.8	17.6	16.7	16.5
Elapsed rate	17.0	18.8	17.2	17.5
Net rate	20.6	21.5	20.4	20.4
Sydney				
Crane rate	15.0	15.8	16.3	16.3
Elapsed rate	17.6	18.7	17.6[r]	18.2
Net rate	21.0	21.9	22.4	23.3
Melbourne				
Crane rate	16.3	17.0	18.4[r]	19.6
Elapsed rate	18.8	20.2	20.5[r]	21.1
Net rate	21.9	23.4	26.1[r]	25.6
Adelaide				
Crane rate	18.8	18.9	18.2	19.3
Elapsed rate	22.8	23.3	22.0	22.2
Net rate	23.3	23.8	22.5	22.8
Fremantle				
Crane rate	16.2	17.9	20.0[r]	17.8
Elapsed rate	13.4	15.7	14.8[r]	13.4
Net rate	16.7	18.9	20.0[r]	19.6
Five ports				
Crane rate	15.9	16.9	17.7[r]	18.0
Elapsed rate	17.7	19.3	18.6[r]	19.0
Net rate	20.9	22.3	23.4[r]	23.5

r Figure revised due to amended data from terminal operator.

Sources Patrick, P&O Ports and SeaLand.

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS

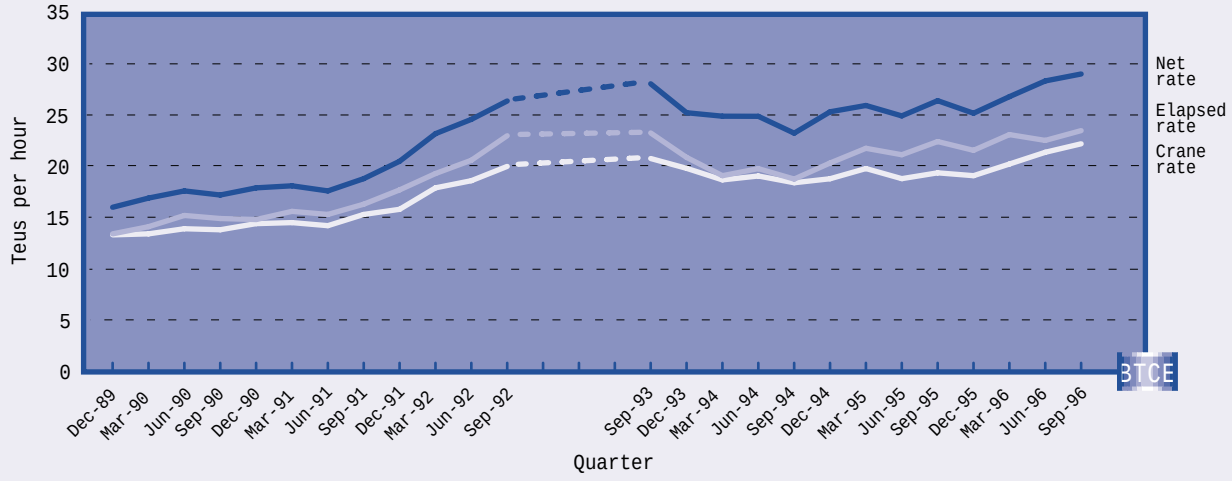


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS

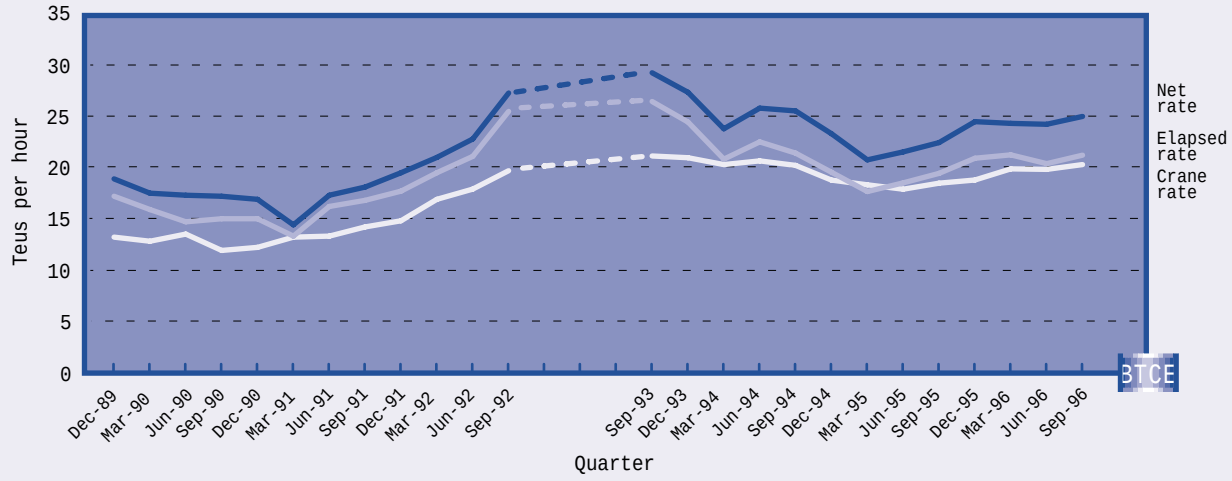
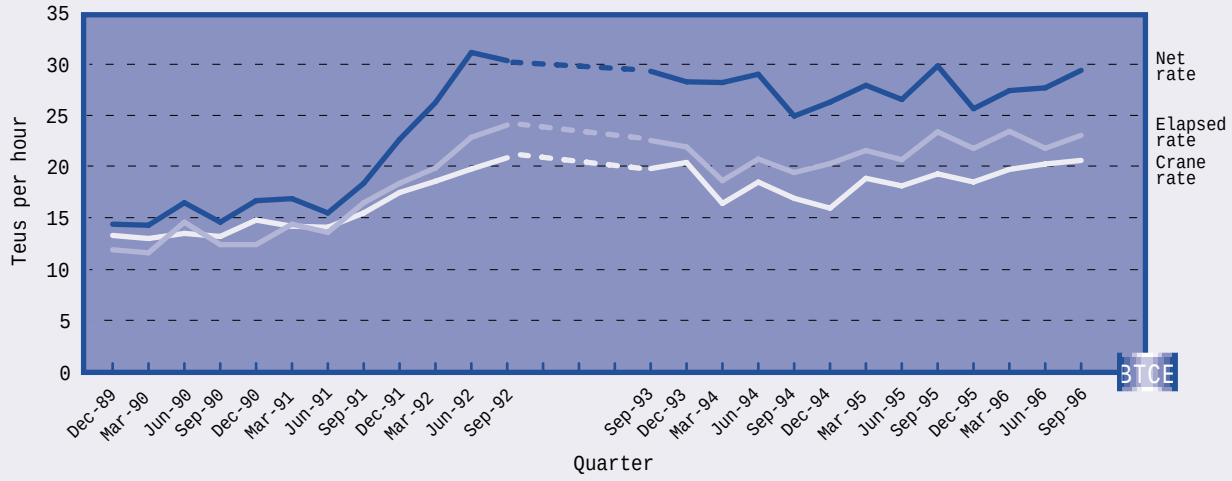


FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS

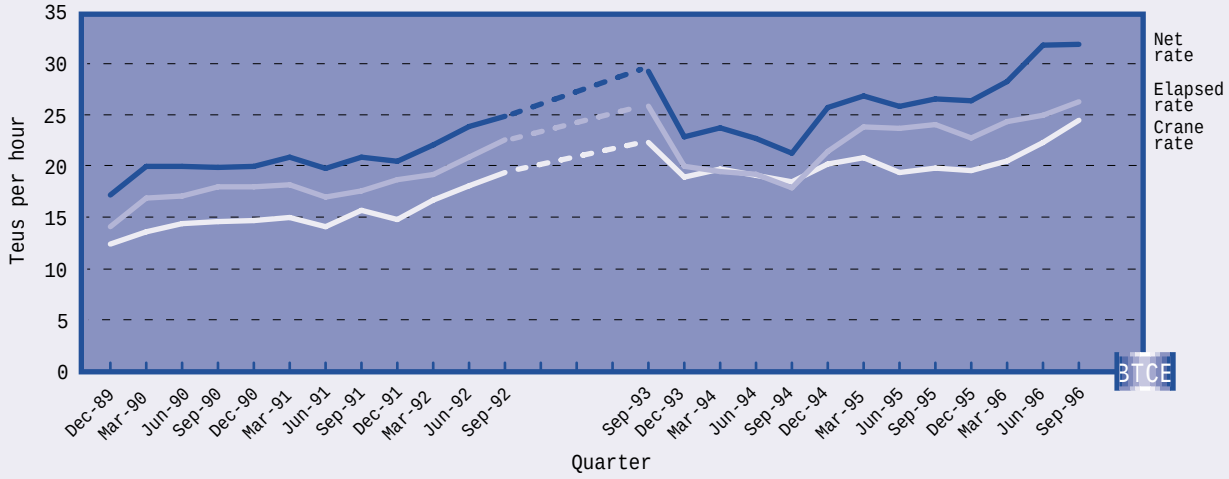


FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS

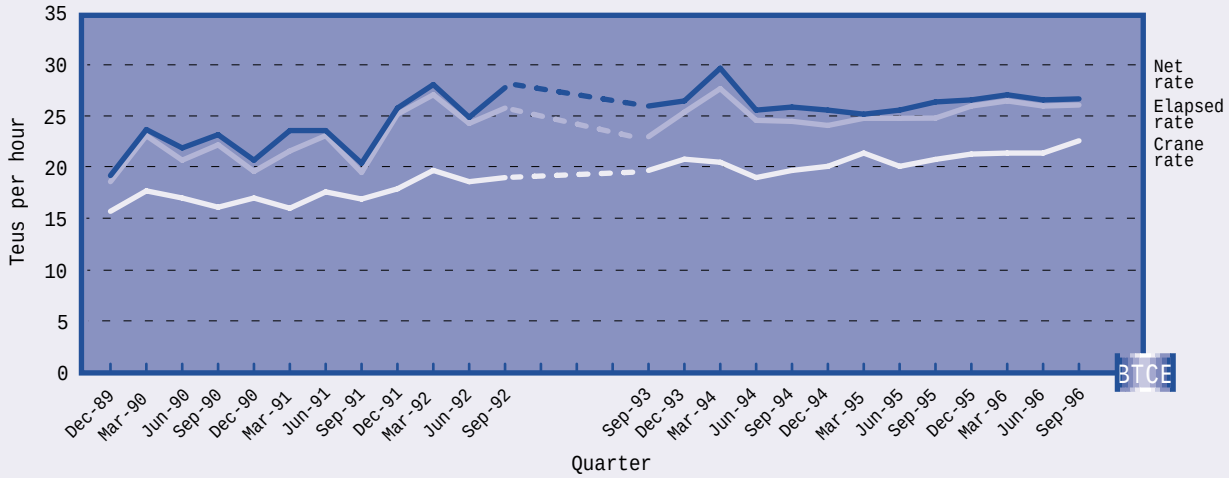
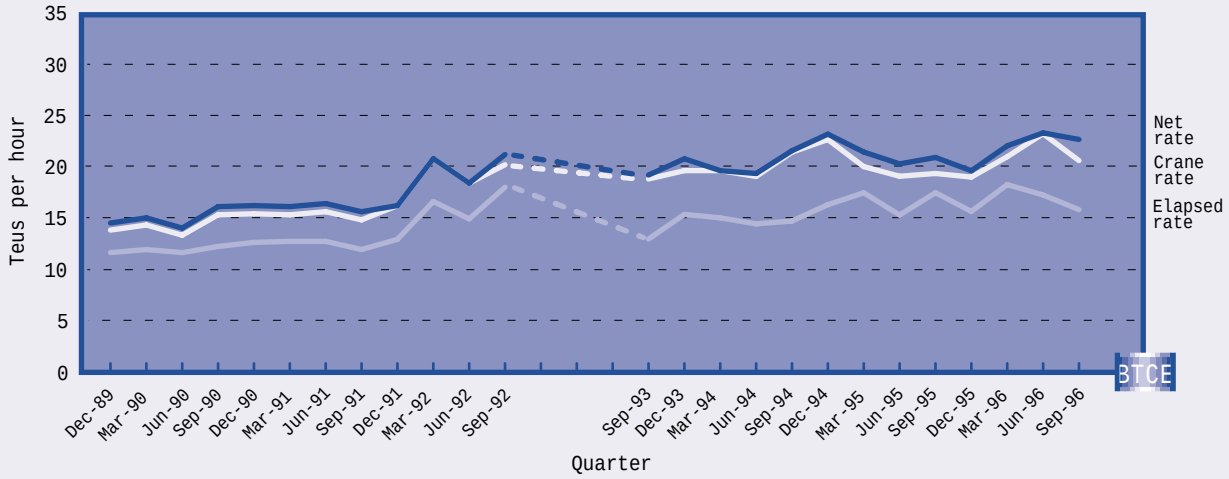


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

WATERFRONT RELIABILITY

The BTCE is currently developing indicators of waterfront reliability for regular inclusion in *Waterline*. These indicators will complement the existing measures of performance which cover stevedoring productivity, port interface costs and port performance (financial and non-financial).

The concept of reliability typically focuses on the *variability and predictability* of performance. In contrast, the available indicators of waterfront performance in Australia generally measure *average* performance over a period of time (for example, the average crane rate).

The indicators of waterfront reliability for publication in *Waterline* are being developed in consultation with major industry participants. A set of proposed indicators has been identified (table 2).

Workshop on reliability

Development of the reliability indicators commenced in July 1996 with a half-day BTCE workshop. The objectives of the workshop were to identify indicators of waterfront reliability and to examine other issues such as the causes of poor reliability. A BTCE paper, circulated to participants prior to the workshop, provided an overview of major issues in the preparation of reliability indicators.

The workshop was attended by 26 representatives of shippers, shipping lines, port authorities, pilots, stevedores, towage operators, customs brokers and government agencies. Industry participants expressed strong support for the development of indicators of waterfront reliability for container shipping. They noted that such indicators would fill a significant gap in the existing measures of waterfront performance.

It was agreed that the indicators should initially cover container traffic at the five mainland capital city ports, and that they might be expanded at a later stage to cover specific aspects of break-bulk cargo. Industry representatives considered that the work on reliability would ideally cover all parts of the ship/port/land transport chain. However, it was agreed that the indicators should initially focus on ship operations (including services such as pilotage and towage) and container terminals.

There was some discussion at the workshop of the appropriate measurement approach. Industry participants strongly supported an approach based on the proportion of observations meeting a given standard (eg the proportion of ship movements where tugs are available to assist the ship within 1 hour of the confirmed ship arrival time). They considered that indicators prepared on this basis would be simpler and easier to understand than more technical measures such as the standard deviation.

Proposed indicators

In August, the BTCE distributed a summary of the workshop proceedings to all participants. A proposed set of reliability indicators, developed on the basis of the workshop discussions, was also circulated to several representatives of shipping lines, stevedores, port authorities and pilots. Their comments were subsequently incorporated in the proposed indicators which are outlined in table 2.

The notice periods for scheduled and confirmed ship movement times in table 2 are based on general operating practices in the shipping industry. The format of the available data, and therefore the indicators for particular ports, may be affected by variations in booking practices at individual ports. For example, in one port the pilots take bookings up to two hours before the time of the ship movement, whereas in another port the final cut-off time is 3.30 pm on the previous working day.

The industry representatives who commented on the draft indicators also provided information on acceptable levels of reliability. These levels were expressed in terms of the minimum proportion of observations that should fall within the specified range for each indicator (eg the percentage within the ±1 hour range). A proportion of 90 per cent was proposed for six of the indicators, reflecting a recognition that some delays are inevitable given Australia's relatively small traffic volumes and the high infrastructure costs that would be incurred to eliminate delays completely. A proportion of 100 per cent was suggested for ship arrival (confirmed time), availability of cargo, stevedoring completion (confirmed time) and stevedoring rate.

Further work

The BTCE is currently obtaining data for the reliability indicators from port authorities and other providers of waterfront services. The data collection process may result in some further refinement of the indicators. It is expected that the first data will be published in the March 1997 issue of *Waterline*.

The data collected by the BTCE should provide a basis for identifying major sources of waterfront unreliability. It is envisaged that, resources permitting, the BTCE will undertake further work on waterfront reliability once the initial statistical series is established.

TABLE 2 PROPOSED INDICATORS OF WATERFRONT RELIABILITY

Aspect	Indicator
Ship arrival at port	Proportion of ship arrivals within ±1 hour of the scheduled ship arrival time advised 24 hours before to the port authority.
	Proportion of ship arrivals within ±15 minutes of the confirmed ship arrival time advised 6 hours before to service providers (pilots, towage operators, linesmen).
Berth availability	Proportion of ship arrivals where the berth is available within 4 hours of the scheduled berthing time advised 24 hours before to the port authority.
Pilotage[a]	Proportion of ship movements where the pilot is available to board the ship at the agreed location within ±1 hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
Towage[a]	Proportion of ship movements where tugs are available to assist the ship at the agreed location within ±1 hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
Linesmen[a]	Proportion of ship movements where linesmen are available to handle the ship within ±1 hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
Availability of cargo for loading	Proportion of receivals completed by the end of the evening shift prior to the ship's arrival.
Stevedoring	Proportion of ship visits where stevedoring completion time is within ± 1 hour of the time initially agreed between the terminal operator and the client when the overall work program for the ship is prepared.
	Proportion of ship visits where stevedoring completion time is within ± 0 hours of the time confirmed by the container terminal operator 6 hours before expected completion.
Stevedoring rate	Proportion of ship visits where the average crane rate for the ship is within ± 2 containers per hour of the average crane rate for the terminal over the period.

a. Covers ship arrivals and ship departures.

CREW TO BERTH RATIOS

The shipping reform process in Australia has included several initiatives to reduce crew costs on merchant and offshore vessels. These initiatives have involved crew sizes, employment practices, and crew to berth ratios.

In broad terms, the crew to berth ratio measures the average number of seafarers required for each position on a ship (or group of ships) over a specified period. More than one seafarer is required for each position as, at a particular time, some crew members will be ashore for purposes such as recreation leave, compensation leave and training.

This article provides an overview of crew to berth ratios in Australian merchant and offshore shipping, based on work undertaken by the BTCE. The data will be regularly updated in future issues of *Waterline*.

Monitoring process

Prior to BTCE monitoring, it was widely believed that the crew to berth ratio for Australian merchant shipping was around 2.2. In 1993 the Government and the Shipping Reform Negotiating Committee agreed on an objective of a 10 per cent reduction in the overall crew to berth ratio (ie to around 2.0). The Shipping Industry Reform Authority (SIRA) subsequently asked the BTCE to undertake a quarterly review of the crew to berth ratio in order to monitor progress towards this objective.

Under the 1994 Maritime Industry Restructuring Agreement (MIRA), Australian shipowners and maritime unions agreed that the monitoring process for merchant shipping should continue. It was also agreed that similar but separate work should be undertaken for ships servicing the offshore oil and gas industry. In addition, the MIRA process reaffirmed the objective for the merchant shipping fleet (an overall crew to berth ratio of 2.0) and established an objective for the offshore shipping fleet (a slightly higher ratio due to additional leave included in the industry's awards).

Most of the companies operating Australian-flag merchant ships and about half of the offshore shipping companies agreed to provide data for the monitoring process. The first crew to berth ratios for merchant shipping were calculated for the September quarter 1993. Monitoring of offshore shipping began in the first quarter of 1995. The BTCE currently receives data from eight companies operating merchant ships and four companies operating offshore ships.

Methodology

The methodology to calculate crew to berth ratios was developed by the Australian National Maritime Association and endorsed by the BTCE.

For the purposes of the monitoring process, the crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship/s (or fleet) operated. Berth days operated is defined as the sum of the number of people required each day during the period to carry out the work assigned to each ship.

The average crew to berth ratio for a shipping operation is effectively the sum of six components:

- ship time—the ratio of days paid for ship duty (which may include travelling time and days signing on and off) to berth days;
- recreation leave—with the ratio for individual operations determined by the industrial awards for merchant and offshore shipping and by company practice;
- compensation leave—reflecting the level of accidents, injuries and sick leave;
- long service leave—with the ratio for individual operations determined by the industrial awards covering merchant and offshore shipping;
- study leave—reflecting days of paid leave for officers for educational purposes; and
- training and other paid leave—including days paid to seafarers taken off their normal duties for work in the office or in port operations.

Ratios for the individual components are calculated by dividing the number of paid person days in each category by the number of berth days for that category.

The crew to berth ratios for the merchant and offshore shipping fleets are weighted averages of the ratios for individual companies. For each fleet, there is some variation in individual company ratios as a result of differences in shipping operations and company practices.

Merchant shipping

Figure 7 presents data on the crew to berth ratio, and its components, for Australian merchant shipping over the period from the September quarter 1993 to the September quarter 1996.

At the start of the monitoring process, the crew to berth ratio for Australian merchant shipping was 2.133. Figure 7 indicates that, over the three years to the end of the September quarter 1996, the ratio dropped below its initial level only once (in the December quarter 1994). The September quarter 1996 figure (2.195) was 2.9 per cent above the initial figure and 9.8 per cent higher than the objective of 2.0 agreed in the MIRA process.

Figure 7 indicates that ship time is the largest component of the crew to berth ratio for merchant shipping. The average ratio for this component is greater than 1.0 because some companies pay seafarers a full day's pay for days signing on or off and for days travelling to or from the ship. In the September quarter 1996 the ship time ratio was 1.041 (initial level 1.025).

Recreation leave is the second largest component of the crew to berth ratio. For the merchant fleet, the minimum recreation leave ratio specified in the award is 0.926 days leave for each day worked. In the September quarter 1996, the recreation leave ratio averaged 0.981 (initial level 0.971). There is some variation in the ratios for individual companies as a result of factors such as above award leave provisions, accumulation of leave for travel days and days signing on or off, and variation in crewing levels in relation to berth days.

Figure 7 shows that seafarers' compensation leave is the third largest component of the crew to berth ratio for merchant shipping. The MIRA agreement envisaged that reductions in compensation claims would contribute significantly to reductions in the crew to berth ratio. However, compensation leave has been above the initial level in the first three quarters of 1996. The September quarter 1996 compensation ratio (0.090) was 23.3 per cent above the initial figure (0.073).

Long service leave for seafarers accumulates at the rate of 13 weeks for 15 years on the register which equates to 0.8667 weeks (about 6.1 days) per year. Figure 7 indicates that the long service leave ratio for merchant shipping has been virtually constant over the three years, with a figure of 0.036 in the September quarter 1996.

The study leave and the training and other components together accounted for only 2 per cent of the total crew to berth ratio in the September quarter 1996. The study leave ratio (0.023) was slightly below its initial level (0.024), while the training and other ratio (0.024) was considerably above its initial level (0.006).

Table 3 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, in the September quarter 1996. Catering crew had the highest crew to berth ratio (2.216) followed by integrated ratings (2.198), engineers (2.186) and deck officers (2.181).

FIGURE 7 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

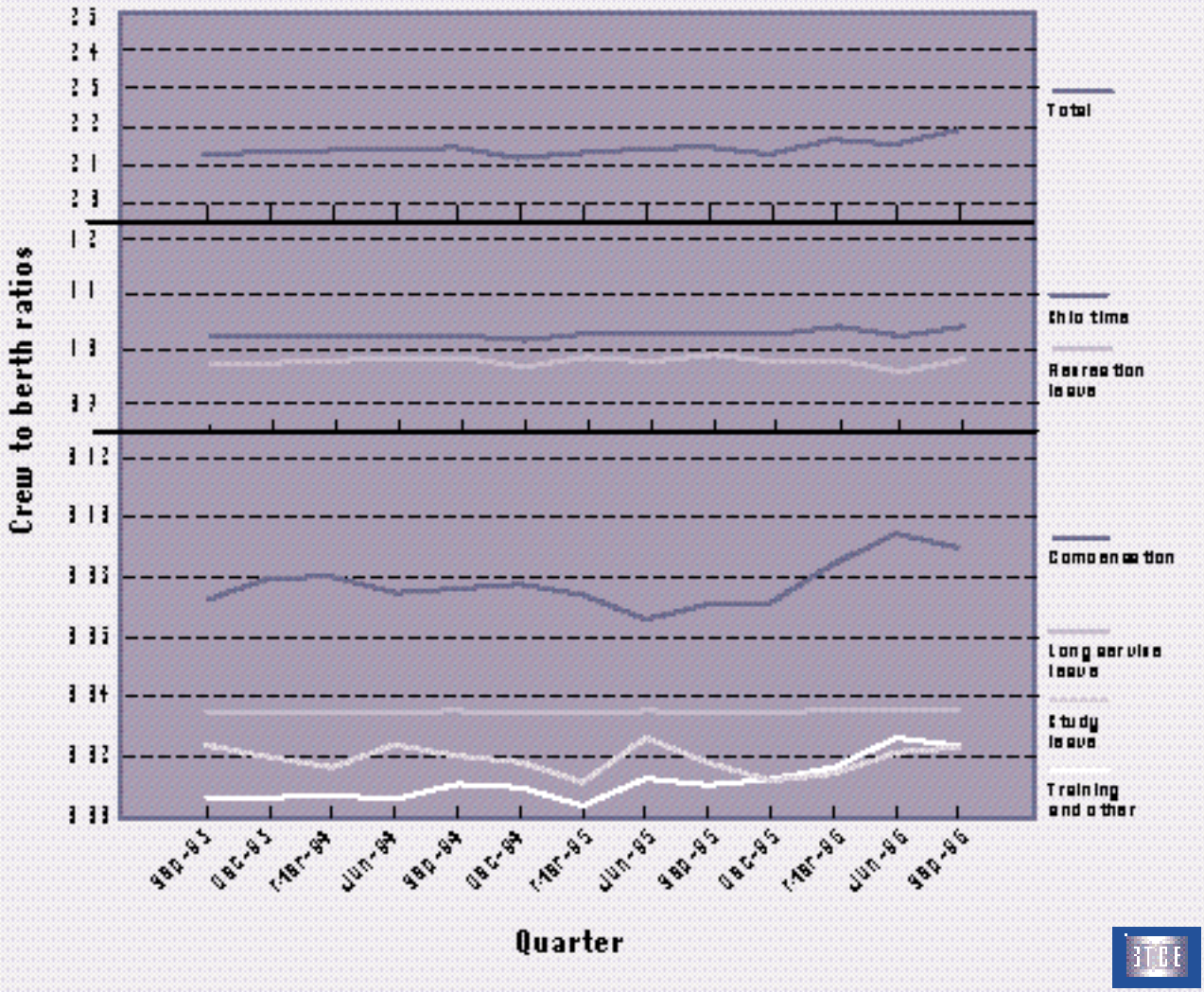


TABLE 3 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1996

Crew type	Ship time	Recreation leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.039	0.979	0.034	0.036	0.039	0.053	2.181
Engineers	1.039	0.977	0.026	0.036	0.063	0.046	2.186
All officers	1.039	0.978	0.030	0.036	0.051	0.050	2.184
Integrated ratings	1.047	0.986	0.127	0.036	0.000	0.002	2.198
Catering crew	1.036	0.975	0.167	0.036	0.000	0.002	2.216
All ratings	1.043	0.983	0.140	0.036	0.000	0.002	2.204
All crew	1.041	0.981	0.090	0.036	0.023	0.024	2.195

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

Source Data provided by ship operators

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

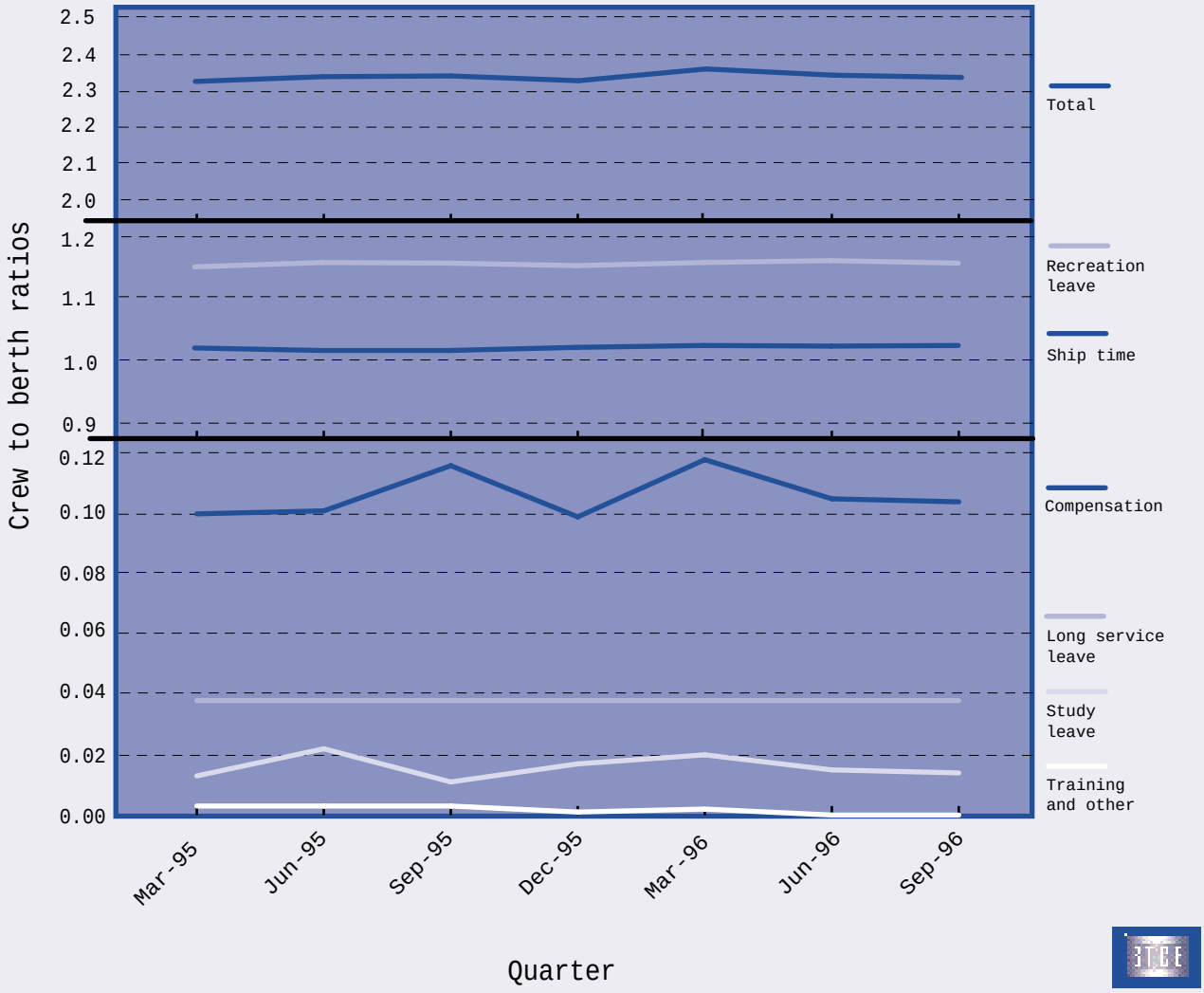


TABLE 4 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1996

Crew type	Ship time	Recreation leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.023	1.156	0.060	0.037	0.009	0.000	2.286
Engineers	1.018	1.157	0.045	0.038	0.050	0.000	2.307
All officers	1.020	1.157	0.053	0.038	0.029	0.000	2.296
Integrated ratings	1.027	1.158	0.163	0.039	0.000	0.000	2.387
Catering crew	1.038	1.153	0.107	0.038	0.000	0.000	2.336
All ratings	1.029	1.157	0.155	0.039	0.000	0.000	2.380
All crew	1.025	1.157	0.104	0.038	0.014	0.000	2.338

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

Source Data provided by ship operators

Offshore shipping

Figure 8 presents data on the crew to berth ratio, and its components, for Australian offshore shipping over the period from the March quarter 1995 to the September quarter 1996.

The overall crew to berth ratio for offshore shipping at the start of the monitoring process was 2.327. Figure 8 shows that the ratio has remained above that level in every subsequent quarter. In the September quarter 1996 the crew to berth ratio was 2.338, 0.5 per cent above the initial level.

Figure 8 indicates that recreation leave is the largest component of the crew to berth ratio for offshore shipping. A minimum factor of 1.153 recreation days for each day worked is specified in the industrial award for the offshore shipping industry. In the September quarter 1996, the recreation leave ratio averaged 1.157 (initial level 1.151).

The average ratio for ship time was 1.025 in the September quarter 1996 (initial level 1.021). The ship time ratio for the offshore fleet will generally be closer to 1.0 than the ratio for the merchant fleet since the work of the offshore fleet does not involve long sea voyages requiring crew changes in distant ports. Travel time to or from the ship and arrangements for signing on or off do not usually involve an extra day's pay in the offshore industry.

Figure 8 shows that compensation leave is the third largest component of the crew to berth ratio for the offshore fleet. The September quarter 1996 figure was 0.104, 4.0 per cent higher than the figure at the beginning of the monitoring process (0.100). The compensation ratio has dropped below its initial level in only one subsequent quarter.

Long service leave in the offshore shipping industry accumulates at the same rate as in the merchant shipping industry (about 6.1 days per year). Figure 8 indicates that the ratio for offshore shipping has been constant since the March quarter 1995.

The study leave and the training and other components fluctuate considerably from quarter to quarter in the offshore shipping industry. However, these components have generally accounted for less than 1.0 per cent of the overall crew to berth ratio for offshore shipping.

Table 4 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, in the September quarter 1996. Integrated ratings had the highest crew to berth ratio (2.387) followed by catering crew (2.336), engineers (2.307) and deck officers (2.286).

Concluding comments

The crew to berth ratio provides a measure of the average number of seafarers required for each position on a ship (or group of ships) over a specified period. The shipping industry reform process in Australia has included targets for reductions in the crew to berth ratios for merchant and offshore shipping.

These reform targets have not been achieved over the period of the BTCE's monitoring process. Crew to berth ratios have increased for both merchant shipping (since the September quarter 1993) and offshore shipping (since the March quarter 1995).

PORT CHARGING-STRUCTURES AND TERMINOLOGIES

The BTCE's Port Interface Cost Index provides a measure of shore-based shipping costs for containers. It focuses on charges at Australia's five mainland capital city ports. The development of the index is described in BTCE Report 84 (BTCE 1993).

The Port Interface Cost Index incorporates a range of charges on ships and cargo. The terminologies used for stevedoring charges, customs brokers' fees and road transport charges are consistent across ports. However, there is some inter-port variation in the terminologies for several components of port and related charges.

This article provides an overview of port and related charges at Australia's six largest container ports—the five mainland capital city ports and Burnie. A feature article on port interface costs at Burnie will be included in the next issue of *Waterline*.

Structures of port and related charges

The port and related charges in the Port Interface Cost Index comprise six categories of ship-based charges and three categories of cargo-based charges. Table 5 outlines these charges at the six major container ports. It indicates that there is significant inter-port variation in the structures of port and related charges.

All of the ports have pilotage, towage and wharfage charges. There are separate charges for mooring/unmooring at all ports except Adelaide where charges for these services are included in the tonnage charge.

The other categories of port and related charges apply at specific ports. There are conservancy charges at three ports and tonnage charges at five ports. Berth hire, harbour dues and berth charges are each applied at only one port.

Table 5 also indicates that there is some inter-port variation in the terminology within charging categories. Charging terminology is discussed below in terms of conservancy, tonnage, wharfage, and other port and related charges.

Conservancy

Conservancy charges cover calls by a particular ship at one or more ports in a State over a specified period. This category was previously called State government charges but has been renamed to reflect changes at Adelaide where the charge is now collected by the port authority/corporation.

The conservancy charges at individual ports (November 1996) are as follows:

- Brisbane—Conservancy Dues of $0.183 per gross registered tonne, valid for one month, paid to a State government department;
- Adelaide— Navigation Service Charge per visit of $830 plus $0.0915 per gross registered tonne, with a 25 per cent reduction for each additional visit within a six month period, paid to the port authority/corporation; and
- Fremantle—Conservancy Dues of $0.0919 per gross registered tonne, valid for 2 months, paid to a State government department.

Tonnage

Tonnage charges, which are paid to port authorities/corporations, are applied at all ports except Brisbane. There is significant inter-port variation in the terminology for these charges. The charges per port entry at individual ports for container ships (November 1996) are as follows:

- Sydney—Navigation Services Charge of $0.41 per gross registered tonne;
- Melbourne—Channel Use Charge of $0.40 per gross registered tonne;
- Adelaide—Harbor Service Charge of $2 600 plus $0.00435 per gross registered tonne per hour at berth;
- Fremantle—Tonnage Rates of $0.147 per gross registered tonne (for ships without an inboard incinerator) or $0.140 per gross registered tonne (for ships with an inboard incinerator); and
- Burnie—Tonnage Rates of $0.07 per gross registered tonne for the first day (maximum of $775), $0.02 per gross registered tonne per day for the next 9 days (maximum of $220 per day) with a maximum of $1 535 for any period up to and including the tenth day, and $0.0194 per gross registered tonne per day after the tenth day.

Wharfage

Wharfage, which is a cargo-based charge payable by cargo owners, is collected by port authorities/corporations at all of the ports. The charges included in this category of the Port Interface Cost Index are called wharfage at all ports except Adelaide where the term is Cargo Service Charge.

The ports generally have separate wharfage rates for 20 foot and 40 foot containers and for loaded and empty containers. Charges at individual ports also distinguish between:

- overseas imports, and exports and local imports (Sydney);
- transhipped and other cargo (Melbourne);
- primary produce and other commodities (Adelaide);
- landbridged and other cargo (Adelaide and Fremantle);
- import and export containers (Burnie); and
- dry and reefer containers (Burnie).

Other port and related charges

The terminology for pilotage, towage and mooring/ un-mooring charges is consistent across ports. The berth hire, harbour dues and berth charge categories each apply at only one port.

Pilotage services are provided by private operators at four ports (Brisbane, Sydney, Melbourne and Fremantle) and by port authorities/corporations at two ports (Adelaide and Burnie). The charges are generally based on the gross registered tonnage of the ship, although in Fremantle there is a flat rate for each service.

Towage services are provided by private operators at each of the six ports. The charge per tug for each ship movement at a port is based on the gross registered tonnage of the ship.

Mooring and unmooring services for container ships are provided on a sole operator basis by port authorities/ corporations at three ports (Adelaide, Fremantle and Burnie) and by private operators at two ports (Brisbane and

Sydney). At Melbourne, these services are now provided by Melbourne Port Services (a subsidiary of the port authority / corporation) and Melbourne Mooring Services (a private operator). Charges for mooring and unmooring are based on the number of staff and the time taken to handle the ship (Brisbane), the gross registered tonnage of the ship (Sydney), ship length (Melbourne), a flat rate per service (Fremantle) or an hourly labour rate (Burnie). As noted earlier, there is no separate charge for basic mooring and unmooring services at Adelaide.

Ship-based berth hire at Melbourne is charged by the terminal operators. The charges are based on hourly rates while the ship is at the berth.

Harbour dues at Brisbane are paid to the port authority / corporation. The container cargo rate varies for 20 foot and 40 foot containers, for full and empty containers, and for refrigerated and other cargoes.

The berth charge (cargo berth hire) at Fremantle is paid to the port authority / corporation. There are flat rates for 20 foot and 40 foot containers.

Comparing charges

Any inter-port comparisons of port and related charges should not be based on individual components alone. The comparisons should include all of the major ship-based and cargo-based charges in a form such as the Port Interface Cost Index.

The variation between ports in charging structures and terminologies reflects responses to local factors and differences in port authority / corporation objectives and pricing strategies. The pricing objectives which may be pursued by port authorities / corporations include the facilitation of trade, minimising charges for port users and achieving a specified return on investment. For example, the absence of a tonnage charge at Brisbane reflects the port authority / corporation strategy of encouraging ship calls at the port.

Concluding comments

There is significant variation in the structures of port and related charges at Australia's six largest container ports. The terminologies for conservancy, tonnage and wharfage charges also vary between ports. The variation in charging structures and terminologies between ports reflects responses to local factors and differences in port authority / corporation objectives and pricing strategies.

TABLE 5 PORT AND RELATED CHARGES INCLUDED IN THE PORT INTERFACE COST INDEX

Charges	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Burnie
Ship-based						
Conservancy[a]	Conservancy Dues	-	-	Navigation Service Charge	Conservancy Dues	-
Tonnage	-	Navigation Services Charge	Channel Use Charge	Harbor Service Charge	Tonnage Rates	Tonnage Rates
Pilotage	Pilotage	Pilotage	Pilotage	Pilotage	Pilotage	Pilotage
Towage	Towage	Towage	Towage	Towage	Towage	Towage
Mooring & unmooring	Mooring & unmooring	Mooring & unmooring	Mooring & unmooring	d	Mooring & unmooring	Mooring & unmooring
Berth hire	-	-	Berth hire	-	-	-
Cargo-based						
Wharfage	Wharfage	Wharfage[c]	Wharfage	Cargo Service Charge	Wharfage	Wharfage
Harbour dues	Harbour Dues	-	-	-	-	-
Berth charge[b]	-	-	-	-	Cargo Berth Hire	-

- *not applicable*

a. *Previously called State government.*

b. *Previously called berthing*

c. *Includes Port Cargo Access Charge*

d. *All mooring costs associated with a ship's initial arrival and final departure at Adelaide are included in the Harbor Service Charge.*

Sources *Price schedules of port authorities/corporations, towage operators and pilotage service providers.*

INDEX OF WATERLINE ARTICLES—ISSUES 1 TO 9

Subject	Issue	Date	Pages	Coverage of article[a]
Coal ports in Australia	6	March 1996	10–13	Ports, terminals, capacity and operational changes, performance
Comparing port charges—methodology	4	October 1995	9–11	Teu exchanges and comparisons of port charges
Crew to berth ratios	9	December 1996	7–11	Recent trends for Australian merchant and offshore shipping
Distribution of benefits of waterfront reform	3	May 1995	11–14	Stevedoring, ship operators, importers, exporters
International comparisons of waterfront performance	4	October 1995	11–13	Overview of recent work
	5	December 1995	9–11	New Zealand ports
	6	March 1996	13–16	Asian ports
	7	June 1996	12–14	European ports
	8	September 1996	14	New Zealand (timber & steel coil)
Liner shipping	5	December 1995	11–13	Conference/non-conference shares in Australian trades to 1994/95
Non-containerised general cargo	8	September 1996	11–14	Cargoes, ships, ports, stevedoring, performance data
Port authority financial performance	1	July 1994	4–6	1992/93
	3	May 1995	5–6	1993/94
	6	March 1996	7–9	1994/95
Port charging—structures and terminologies	9	December 1996	11–13	Australia's six largest container ports
Port Interface Cost Index	1	July 1994	2–5	July–December 1993
	2	December 1994	2–5	January–June 1994
	3	May 1995	2–5	July–December 1994
	5	December 1995	2–5	January–June 1995
	7	June 1996	6–9	July–December 1995
	8	September 1996	6–9	January–June 1996
Port non-financial performance	1	July 1994	4–6	July–December 1993
	2	December 1994	5, 9	January–June 1994
	3	May 1995	6–7	July–December 1994
	6	March 1996	8–9	January–June 1995
	7	June 1996	10–11	July–December 1995
	8	September 1996	10–11	January–June 1996
Reliability	6	March 1996	6–7	Stevedoring industrial disputes
	7	June 1996	11–12	Concepts and available data
	9	December 1996	6–7	Proposed indicators
Stevedoring performance[b]	1	July 1994	5–11	December quarter 1993
	2	December 1994	6–11	March & June quarters 1994
	3	May 1995	7–11, 15	September & December quarters 1994
	4	October 1995	2–9, 15	March & June quarters 1995
	5	December 1995	5–9, 15	September quarter 1995
	6	March 1996	2–7, 19	December quarter 1995
	7	June 1996	2–6, 15	March quarter 1996
	8	September 1996	2–5, 15	June quarter 1996
	9	December 1996	2–5, 15	September quarter 1996

a. *Period is latest quarter or half-year covered. Articles may also include earlier data.*

b. *For earliest available data on stevedoring performance (from December quarter 1989), see issue 1 (table 7) or issue 2 (table 6).*

TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, MARCH QUARTER 1992— SEPTEMBER QUARTER 1996

Port	Mar–92	Jun–92	Sep–92	.....	Sep–93	Dec–93	Mar–94	Jun–94	Sep–94	Dec–94	Mar–95	Jun–95	Sep–95	Dec–95	Mar–96	Jun-–96	Sep–96	Past four quarters
Brisbane																		
Ships handled	85	96	93	na	106	111	112	140	140	187	136	123	135	132	124	133	140	529
Total teus	28235	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	35833	45172	50000	177444
Crane rate	17.0	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.4	19.8
Elapsed rate	19.6	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.3	20.5	21.3	21.0
Net rate	21.1	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.6
Sydney																		
Ships handled	105	109	112	na	205	238	177	240	223	221	218	202	192	203	206	216	228	853
Total teus	71702	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	127726	127995	135445	534912
Crane rate	18.6	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.8	20.3	20.6	19.8
Elapsed rate	19.9	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.5	21.8[r]	23.1	22.6
Net rate	26.3	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	27.5	27.7	29.5	27.6
Melbourne																		
Ships handled	108	121	121	na	235	306	211	265	267	244	265	228	221	227	228	262	274	991
Total teus	73441	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	152440	157966	173267	657239
Crane rate	16.7	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3[r]	24.5	21.7
Elapsed rate	19.2	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0[r]	26.3	24.6
Net rate	22.1	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.9[r]	31.9	29.6
Adelaide																		
Ships handled	22	20	21	na	21	26	28	34	31	33	35	50	34	42	47	63	70	222
Total teus	10810	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	72595
Crane rate	19.8	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	21.8
Elapsed rate	27.2	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	26.3
Net rate	28.2	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	26.9
Fremantle																		
Ships handled	71	75	72	na	116	115	127	135	121	124	128	136	139	124	143	153	159	579
Total teus	25403	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	41916	45650	44537	176765
Crane rate	21.0	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4[r]	20.8	21.2
Elapsed rate	16.8	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.5	17.4[r]	16.0	16.9
Net rate	21.0	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5[r]	22.9	22.1
Five Ports																		
Ships handled	391	421	419	na	683	796	745	814	782	809	782	739	721	728	748	827	871	3174
Total teus	209591	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	373870	395586	423768	1618955
Crane rate	18.0	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.5[r]	22.3	20.8
Elapsed rate	19.4	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6[r]	23.6	22.8
Net rate	23.3	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	26.9	28.5[r]	29.1	27.5

na not available

r Figure revised due to amended data from terminal operator.

Notes 1. To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993.

2. Indicators cover all quay crane operations on cellular ships calling at the container terminals.

3. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.

ABBREVIATIONS

AGPS	Australian Government Publishing Service
BTCE	Bureau of Transport and Communications Economics
MIRA	Maritime Industry Restructuring Agreement
SIRA	Shipping Industry Reform Authority
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

REFERENCES

BTCE 1993, *Port Interface Cost Index*, Report 84, AGPS, Canberra.

DEFINITIONS

Elapsed time—the total time the ship is alongside the berth offering for work whether worked or not, measured from labour first ordered to last labour ashore.

Elapsed rate—the number of teus or containers moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at the ship operator's request.

Net rate—the number of teus or containers moved per net hour.

Crane rate—the number of teus or containers moved per crane per net hour.

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WATERLINE

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BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This issue of *Waterline* includes our regular articles on stevedoring performance, port interface costs, port performance and crew to berth ratios. A feature article covers port interface costs at Burnie.

The discussion of stevedoring performance in *Waterline* now focuses on indicators expressed in containers per hour. This approach is generally considered to provide a more rigorous basis for productivity comparisons than indicators expressed in teus per hour. At this stage, the teu-based measures will be retained for the Port Interface Cost Index and port performance data.

Stephen Hunter
Director

IN BRIEF

Stevedoring performance

Due to delays in receiving key data for Sydney, the December quarter indicators cover only four ports. It is expected that the data for Sydney, and the five-port averages, will be published in the June issue of *Waterline*. If these data become available in time, they will be released prior to the June issue.

In the December quarter, crane rates increased at Brisbane (16.9 containers per hour), Adelaide (19.6 containers per hour) and Fremantle (18.2 containers per hour). Net rates and elapsed rates generally improved at these three ports. At Melbourne, there were declines in the crane rate (17.8 containers per hour), net rate and elapsed rate.

Waterfront reliability

The BTCE has identified some gaps in the reliability data that are currently available from the providers of waterfront services. Alternative data sources are being developed for several indicators.

Port Interface Cost Index

Between January–June and July–December 1996, the national Port Interface Cost Index declined by 0.6 per cent for an import teu and by 0.7 per cent for an export teu. The reductions in the national index mainly reflected lower port and related charges per teu at three ports and lower road transport charges at two ports.

Burnie

Port interface costs at Burnie increased slightly in 1996. The available data indicate that several components of port interface costs are relatively low at Burnie. However, caution should be used in drawing conclusions from the relative costs indicated by the data.

Port performance - financial

There was significant variation in the financial performance of individual port authorities/ corporations in 1995/96. Factors affecting performance included asset revaluations, restructuring of capital and income tax equivalent payments.

Port performance - non-financial

Total cargo throughput (bulk and general cargo) at the five mainland capital city ports declined by 0.8 per cent between January–June and July–December 1996. Container traffic (teus) increased by 9.5 per cent. Median ship turnaround time increased at three of the four ports for which data are available.

Crew to berth ratios

Crew to berth ratios for Australian merchant and offshore shipping increased in the December quarter 1996. The ratios remained above the targets agreed as part of the shipping industry reform process.

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STEVEDORING PERFORMANCE

Commencing with this issue of *Waterline,* the discussion of stevedoring performance will focus on indicators expressed in containers per hour. These indicators provide a more rigorous basis for productivity comparisons than measures expressed in teus per hour because they are not affected by variations in the mix of 20 foot and 40 foot containers. A range of major industry participants have also stated that container-based indicators are the most appropriate basis for productivity measurement.

The available information suggests that the five-port average crane rate was 10–11 containers per hour at the beginning of the WIRA process and around 16 containers per hour at the end of the process. *Waterline* data (table 1) indicate that the figure was 18 containers per hour in the September quarter 1996.
[NB. Some containers per hour figures for the March, June and September quarters of 1996 have been revised to incorporate amended weighting figures provided to the BTCE. The figures in question are highlighted in the table. No change is greater than 0.3 of a container and the majority are of the order of 0.2 of a container.]

Waterline has traditionally reported stevedoring indicators on the basis of teus per hour as this format was adopted in the earlier data published by WIRA. The teu-based data, which are presented in figures 1 to 6 and table 12, will be retained in Waterline for the purposes of long-term historical comparison.

December quarter data

This issue of *Waterline* contains stevedoring performance data up to the December quarter 1996 for Brisbane, Melbourne, Adelaide and Fremantle.

The data for Sydney, and the five-port averages, cover the period to the September quarter 1996. As a result of difficulties with a new computer system at one of the Sydney container terminals, the December quarter data for Sydney were not available for this issue of *Waterline*. It is expected that the data will be published in the June issue.

Table 1 presents the stevedoring performance data over the last four or five quarters in terms of containers (ie moves) per hour. The data for Brisbane, Sydney, Melbourne and Fremantle are averages for the terminals operated by P&O Ports and Patrick at each port. The Adelaide data cover the SeaLand terminal.

Five-port average

Due to the unavailability of a complete set of stevedoring performance data for Sydney, the BTCE has been unable to prepare the five-port averages for the December quarter in this issue.

Brisbane

Stevedoring performance at Brisbane generally improved in the December quarter.

The crane rate was 16.9 containers per hour, up from 16.5 containers per hour in the previous quarter.

The net rate remained steady at 20.4 containers per hour in the December quarter. Average crane intensity was 1.22 compared with 1.24 in the previous quarter.

Brisbane's elapsed rate was 17.4 containers per hour in the December quarter, up slightly from 17.2 containers per hour in the September quarter. On a per crane basis the figure increased to 14.2 containers per hour, from 13.8 containers per hour in the previous quarter.

The average proportion of elapsed time not worked at Brisbane was 15.0 per cent in the December quarter, compared with 15.6 per cent in the September quarter.

Sydney

Due to difficulties with a new computer system at one of the Sydney container terminals, the operator was not able to extract performance data for the December quarter.

Melbourne

At Melbourne, there was a decline in stevedoring performance in the December quarter. This followed improvements in the previous three quarters associated with major upgrading of facilities and equipment at

the container terminals. The decline in the December quarter reflected difficulties associated with the introduction of a new enterprise-based agreement at one of the terminals.

The crane rate at Melbourne was 17.8 containers per hour in the December quarter, down from 19.6 containers per hour in the previous quarter.

The net rate declined to 21.7 containers per hour in the December quarter from 25.6 containers per hour in the September quarter. Average crane intensity was 1.21 compared with 1.31 in the previous quarter.

Melbourne's elapsed rate was 17.9 containers per hour in the December quarter, down from 21.1 containers per hour in the September quarter. On a per crane basis the figure declined to 14.8 containers per hour, from 16.2 containers per hour in the previous quarter.

The average proportion of elapsed time not worked at Melbourne was 17.8 per cent in the December quarter, virtually unchanged from the figure of 17.6 per cent in the September quarter.

Adelaide

Adelaide's stevedoring performance improved in the December quarter.

The crane rate increased to 19.6 containers per hour, from 19.3 containers per hour in the previous quarter. This continued the general upward trend over the period covered by table 1.

The net rate rose to 23.1 containers per hour in the December quarter from 22.8 containers per hour in the September quarter. Average crane intensity was unchanged at 1.18.

Adelaide's elapsed rate was 22.6 containers per hour in the December quarter, up from 22.2 containers per hour in the September quarter. On a per crane basis the figure rose to 19.2 containers per hour, from 18.8 containers per hour in the previous quarter.

Adelaide continued to have a very low proportion of time not worked. The average proportion of elapsed time not worked was 2.2 per cent in the December quarter, compared with 2.6 per cent in the previous quarter.

Fremantle

Stevedoring performance at Fremantle improved in the December quarter, partly reversing the decline in the September quarter which followed two consecutive quarters of productivity increases. Factors contributing to improved performance included the consolidation of the container berths, the introduction of new enterprise-based agreements at the terminals and the installation of a new crane.

Fremantle's crane rate was 18.2 containers per hour in the December quarter, up from 17.8 containers per hour in the previous quarter.

The net rate rose to 20.5 containers per hour in the December quarter from 19.4 containers per hour in the September quarter. Average crane intensity was 1.12 compared with 1.09 in the previous quarter.

Fremantle's elapsed rate was 15.6 containers per hour in the December quarter, up from 13.4 containers per hour in the September quarter. On a per crane basis the figure rose to 13.9 containers per hour, from 12.3 containers per hour in the previous quarter.

The average proportion of elapsed time not worked at Fremantle was 23.9 per cent in the December quarter, down from 31.0 per cent in the September quarter.

Teus per hour

Figures 1 to 6 and table 12 present the stevedoring indicators in terms of teus per hour over the period from the WIRA process. They cover the same ship calls as the containers per hour data in table 1.

The performance changes indicated by the teu-based measures between the September and December quarters were generally in the same direction as the changes indicated by the container-based measures. The only differences were at Brisbane where there was a significant variation in the mix of 20 foot and 40 foot containers over the period.

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RELIABILITY

Issue 9 of *Waterline* presented the proposed indicators of waterfront reliability which have been developed in consultation with major industry participants.

In late December the BTCE formally requested port authorities/corporations and container terminal operators at the five mainland capital city ports to provide data for the indicators. Approaches were also made to several other providers of waterfront services.

Responses from the industry indicate that there are some gaps in the reliability data that are available from the providers of waterfront services at Australian ports. The availability of data for non-stevedoring aspects of reliability varies significantly between ports. In relation to the stevedoring indicators, one terminal operator has provided about one-half of the data requested by the BTCE.

As there appear to be some significant gaps in the available data for waterfront reliability indicators, the BTCE has reviewed the proposed indicators. Alternative data sources are being developed for several indicators in consultation with major industry participants.

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PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs for containers moved through Australia's mainland capital city ports. It incorporates the charges of various providers of waterfront-related services. These charges represent costs to shipping lines and shippers.

The major components of the Port Interface Cost Index are port and related charges, stevedoring charges and land-based charges. The index is calculated for individual ports and on a national basis.

Cost parameters

The representative ship used to calculate port and related charges for July–December 1996 was unchanged from the ship used in the previous period (table 2).

The average number of teus exchanged per port call for ships in the representative range increased at Brisbane (9.9 per cent), Melbourne (3.6 per cent) and Fremantle (3.6 per cent) between January–June 1996 and July–December 1996. There were declines at Sydney (3.1 per cent) and Adelaide (4.2 per cent).

Port and related charges per ship visit

The port and related charges in the Port Interface Cost Index incorporate ship-based and cargo-based components. The ship-based charges are conservancy (previously called State government), tonnage, pilotage, towage, mooring/unmooring and berth hire. The cargo-based charges are wharfage, harbour dues and berth charge (previously called berthing).

The last two rows in table 3 provide information on total ship-based charges and empty teu charges *per ship visit* for the representative ship. Information on port and related charges *per teu* (ie charges per ship visit divided by average teu exchange) is presented in the rest of the table.

Table 3 indicates that total ship-based charges *per ship visit* were unchanged at Brisbane and Fremantle between January–June 1996 and July–December 1996. There was a minor change at Adelaide as a result of a slight increase in average berth time which affected the time-based tonnage charge.

Ship-based charges per ship visit declined at Sydney following a 10.9 per cent reduction in the tonnage charge from 1 July 1996. There was also a decline at Melbourne as a result of a 35.4 per cent reduction in mooring/unmooring charges (excluding launch hire). This reduction more than offset a rise in time-based berth hire charges attributable to higher average berth time at Melbourne.

Table 3 indicates that, for an operator of a vessel similar in size to the representative ship, Fremantle ($17 902) had the lowest total ship-based charges per ship visit in July–December 1996. It was followed by Brisbane ($19 840) and Adelaide ($19 873).

Port and related charges per teu

The level of *ship-based charges per teu* provides an indication of the potential impact of ship-based charges on shippers. This measure is affected by the total charges per ship visit and by the number of teus exchanged per visit. With a given level of charges per ship visit, a reduction in the number of teus exchanged will result in a higher charge per teu to bring the ship into the port. Conversely, an increase in the average exchange will reduce the cost per teu with a given level of charges per ship visit.

Ship-based charges per teu declined at Brisbane (9.1 per cent), Sydney (0.5 per cent), Melbourne (3.7 per cent) and Fremantle (3.5 per cent) between January–June 1996 and July–December 1996. These declines mainly reflected the reductions in ship-based charges per ship visit at Sydney and Melbourne, and the increases in average exchanges at Brisbane, Melbourne and Fremantle. Ship-based charges per teu increased at Adelaide (4.9 per cent) as a result of the decline in the average teu exchange.

Cargo-based charges for loaded containers were unchanged at Brisbane, Sydney and Fremantle in the July–December period. At Melbourne, a 20 per cent reduction in wharfage on loaded and empty containers took effect from 1 July 1996. Wharfage on empty containers at Sydney was reduced to $10 per teu from $25 per teu. Published charges were unchanged at Adelaide, but an increase in the proportion of containers loaded with primary produce (concessional charge) resulted in a slight reduction in the weighted average charge for loaded export containers at the port.

Overall, *port and related charges per teu* (ship-based charges per teu plus cargo-based charges) for loaded export containers declined at Brisbane (4.2 per cent), Sydney (0.2 per cent), Melbourne (12.0 per cent) and Fremantle (1.8 per cent). There was an increase of 2.3 per cent at Adelaide.

Stevedoring charges per teu

The stevedoring charges used in this issue of *Waterline* are the preliminary figures for 1995 obtained from the Australian Competition and Consumer Commission (ACCC). The national weighted average revenue for the ACCC's sample of container terminal operations was $203 per teu in 1995. The stevedoring charges in table 4 will be updated when data for 1996 become available.

Land-based charges per teu

Information on customs brokers' fees and road transport charges is contained in table 4. There were no major changes in these fees and charges between January–June 1996 and July–December 1996.

Customs brokers' fees at Brisbane, Melbourne and Adelaide (exports) were unchanged in July–December 1996 compared with the previous period. There were minor changes ranging between $1 per teu and $3 per teu at Sydney (increase), Adelaide (decline for imports) and Fremantle (increase). As a result of an increase in the number of survey respondents, customs brokers' fees at Adelaide and Fremantle are now reported separately rather than as a combined average.

Road transport charges rose marginally at Melbourne, Adelaide and Fremantle between January–June 1996 and July–December 1996. The increases at these ports ranged between $1 per teu and $3 per teu. There were reductions of a similar magnitude at Brisbane and Sydney.

Indexes for individual ports

Table 4 provides details of port interface costs for individual ports in July–December 1996 and the previous half-year. It indicates that total costs (charges) per teu declined at Brisbane, Sydney and Melbourne. There were increases at Adelaide and Fremantle.

The factors contributing to the changes in port interface costs at each port are shown in figure 7. Port and related charges per teu were the major source of change at Brisbane, Melbourne and Adelaide. They also had a significant impact at Fremantle. Customs brokers' fees contributed to the movements in port interface costs at Sydney, Adelaide (imports only) and Fremantle. Changes in road transport charges affected all ports.

National index

Data on the national Port Interface Cost Index are presented in table 5. In overall terms, the index declined by 0.6 per cent for an import teu and by 0.7 per cent for an export teu between January–June 1996 and July–December 1996. In real terms, the falls were 1.6 per cent for imports and 1.7 per cent for exports.

The reductions in the national index mainly reflected lower port and related charges per teu at three ports (particularly Melbourne) and lower road transport charges at two ports. These reductions were partly offset by higher port and related charges at one port, increases in customs brokers' fees at two ports, and higher road transport charges at three ports. Since the national index is an average (weighted by teu throughput at each port) for the five mainland capital city ports, developments at Sydney and Melbourne have a major impact on the national outcome.

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PORT INTERFACE COSTS AT BURNIE

The BTCE's Port Interface Cost Index provides information on changes in shore-based shipping costs for container traffic at the five mainland capital city ports. These ports handle most of Australia's containerised sea cargo. However, there are also significant movements of containers at Burnie and several other Australian ports.

This article describes the services and facilities for container traffic at Burnie. It also provides estimates of port interface costs at Burnie using the methodology developed for the Port Interface Cost Index.

Trade and services

Burnie, which is located on the north coast of Tasmania, is Australia's fifth largest container port in terms of the total number of containers handled. It services ships in both the coastal and overseas trades.

Burnie handles substantial amounts of bulk cargo as well as containerised and non-containerised general cargo. The major commodities in 1995/96 included general cargo (1.6 million revenue tonnes), mineral concentrates (0.6 million revenue tonnes), vegetables (0.4 million revenue tonnes) and paper (0.4 million revenue tonnes).

Total throughput of bulk and general cargo at Burnie was almost 5.3 million revenue tonnes in 1995/96. Domestic movements accounted for 4.1 million revenue tonnes and the remaining cargo was for the overseas trades.

Container traffic totalled 119 669 teus in 1995/96, an increase of 15 287 teus on the previous year. The majority of this traffic (101 593 teus) was carried on domestic services by Brambles Shipping which operates two ships between Melbourne and Burnie. The company has its own terminal at Burnie.

Most of the remaining 18 076 teus handled at Burnie in 1995/96 involved ships operating in the overseas trades. The services comprised:

- a fortnightly South East Asia service operated by MISC/Nedlloyd/MOL (369 494 revenue tonnes of cargo);
- a monthly South East Asia service operated by ANRO (89 927 revenue tonnes of cargo);
- a monthly European service operated by P&O (48 698 revenue tonnes of cargo); and
- a service, mainly to Japan, operated by COSCO during the vegetable export season (44 882 revenue tonnes of cargo).

In addition to the terminal operated by Brambles, Burnie has two berths for the handling of container ships. Each berth is served by a container crane owned by the Burnie Port Authority. There is a single lift 80 tonne post-Panamax portainer crane at one berth and a twin lift 65 tonne portainer crane at the other berth. Stevedoring services are provided by Patrick and P&O Ports which pay for the use of the container cranes. Other facilities for container traffic include 322 refrigerated container outlets and a ramp for stern loading and unloading.

Pilotage and mooring/unmooring services at Burnie are provided by the port authority. Towage services are operated by a private company, owned by Brambles, which has two tugs operating from Burnie. A vessel similar to the representative ship used in the Port Interface Cost Index typically requires two tugs to berth at Burnie, and departs without towage assistance.

Cost estimates

Table 6 presents estimates of port and related charges at Burnie using the methodology developed for the Port Interface Cost Index.

The ship parameters used to estimate the costs are outlined in table 2. Most of the container ship calls at Burnie involve the Brambles vessels, which are significantly smaller than the representative ship used in *Waterline* (15 000 to 20 000 grt range). The estimates of port interface costs at Burnie are therefore based on ships operating in the overseas trades rather than on ships providing coastal services.

There were 12 calls by vessels in the representative ship range at Burnie in the first half of 1996 and 10 calls in the second half of the year. The average exchanges for these ships were:

- 458 teus, comprising 277 loaded (51 inwards and 226 outwards) and 181 empties in January–June 1996; and
- 454 teus, comprising 275 loaded (80 inwards and 195 outwards) and 179 empties in July–December 1996.

Table 6 indicates that there are four ship-based charges at Burnie–tonnage, pilotage, towage and mooring/unmooring. Wharfage is the only cargo-based charge at Burnie.

Table 7 provides details of port interface costs at Burnie in 1996. In line with the approach used for the five mainland capital city ports, the stevedoring charge is the national average figure prepared by the ACCC.

The BTCE had some difficulty in obtaining data on customs brokers' fees for Burnie as the small number of companies operating in the port raised issues of commercial confidentiality. The fees in table 7 are therefore based on responses to a BTCE survey of major Tasmanian customs brokers.

Information on road transport charges for containers was obtained from several companies providing services in the Burnie area. The charges reflect the relatively short distances between the port and warehouses in Burnie, and the absence of truck delays.

The estimates of port interface costs reported in *Waterline* are primarily intended as indicators of movements in the performance of individual ports over time. Tables 6 and 7 indicate that port interface costs at Burnie increased slightly between January–June 1996 and July–December 1996. The increase reflected rises in tonnage, pilotage, mooring/unmooring and wharfage charges in the July–December period.

A comparison of table 7 with the data for the mainland capital city ports in table 4 indicates that Burnie has lower ship-based charges and higher cargo-based charges (for imports) than the other ports. This reflects significant differences in the structures of port charges.

The data in tables 4 and 7 also indicate that total port interface costs at Burnie are lower than those at the mainland capital city ports, with the major contributing factors being ship-based charges and road transport charges. Caution should be used in drawing conclusions from the relative costs indicated by the data as there are significant differences between ports in factors such as:

- traffic levels;
- patterns of ship calls (including ship sizes);
- physical characteristics (eg distances between the port and warehouse facilities); and
- port authority/corporation pricing practices.

The use of national weighted average revenue for the stevedoring component also means that inter-port variations in stevedoring charges are not captured by the *Waterline* data. In addition, the methodology used to estimate port interface costs does not include service quality or delay costs.

Concluding comments

Burnie is Australia's fifth largest container port in terms of the total number of containers handled. Port interface costs at Burnie increased slightly in the second half of 1996. The available data indicate that several components of port interface costs are relatively low at Burnie, although caution should be used in drawing conclusions from the relative costs indicated by the data.

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PORT PERFORMANCE - FINANCIAL

Information on the financial performance of the five mainland capital city port authorities/corporations in 1994/95 and 1995/96 is presented in table 8.

The comparability of the Melbourne and Adelaide data over the two years is affected by the restructuring of the port authorities/corporations at these ports. Financial data for 1995/96 are not available for Melbourne as the Port of Melbourne Authority was replaced by three entities from 1 March 1996. The 1994/95 data for Adelaide cover January–June 1995, the initial period of operation of Ports Corp South Australia.

As a result of these factors, this article focuses on changes in the financial performance of the port authorities/corporations at Brisbane, Sydney and Fremantle. Some aspects of performance at Adelaide are also discussed.

The financial performance of individual port authorities/corporations in 1995/96 was affected by several factors including asset revaluations, restructuring of capital and the commencement of income tax equivalent payments. The Sydney Ports Authority was corporatised on 1 July 1995 and Fremantle's port authority was commercialised after the period covered by table 8 (from 1 July 1996).

Earnings and assets

Earnings before interest and tax (EBIT) of the Brisbane and Sydney port corporations declined in 1995/96. There was no change in the EBIT of Fremantle's port authority. Adelaide's port corporation was particularly affected by an abnormal item of –$49.3 million associated with the restructuring process.

Operating profit after income tax of the Brisbane and Sydney port corporations declined in 1995/96. There was an increase at Fremantle.

Average total assets of the Sydney and Adelaide port corporations declined in 1995/96. The reduction at Sydney followed a complete asset valuation with an effective date of 1 July 1995. There were increases in average total assets at Brisbane and Fremantle.

Return on assets (EBIT as a proportion of total assets) generally declined in 1995/96. The decline at Brisbane reflected lower EBIT and higher assets. Lower EBIT offset reductions in assets to result in a lower return on assets at Sydney (and Adelaide). At Fremantle, EBIT was steady but total assets increased.

Dividends

Dividends paid by the Brisbane and Sydney (and Adelaide) port corporations declined in 1995/96. Fremantle's port authority did not pay a formal dividend in 1994/95 or 1995/96 due to its high level of debt.

The *dividend payout ratios* of the Brisbane and Sydney port corporations increased in 1995/96 as the reductions in dividends were less than the declines in operating profits. There was no change in the dividend payout ratio of Fremantle's port authority, as a dividend was not paid in either 1994/95 or 1995/96.

Debt and equity

Total debt of Sydney's port corporation increased in 1995/96. A restructuring of the Sydney port corporation's capital in June 1996 included the repayment of Maritime Services Board borrowings and the drawdown of $150 million debt. Brisbane's port corporation made a small borrowing in 1995/96 in the form of a five-year finance lease. The debt of the Adelaide and Fremantle port authorities/corporations declined in 1995/96.

Total equity of the Brisbane and Fremantle port authorities/corporations increased in 1995/96. At Fremantle, the increase in equity reflected several factors including a revaluation of berths and jetties and the phased assumption by the WA Treasury of responsibility for payments relating to the superannuation pension liability for past employees. There were reductions in the equity of the Sydney and Adelaide port corporations. The restructuring of the Sydney port corporation's capital included a return of capital to shareholders.

Debt/equity ratios of the Sydney and Adelaide port corporations rose significantly in 1995/96. The ratio of Brisbane's port corporation was virtually unchanged.

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PORT PERFORMANCE - NON-FINANCIAL

Information on aspects of non-financial performance for the five mainland capital city ports in 1996 is presented in table 9.

Cargo throughput

Total cargo throughput (bulk and general cargo) at the five ports declined by 0.8 per cent between January–June 1996 and July–December 1996. Declines in throughput at Fremantle, and to a lesser extent at Brisbane, offset increases at the other ports.

The decline in total cargo throughput in July–December 1996 followed a rise of 9.6 per cent in the previous half-year. Total cargo throughput in July–December 1996 was 8.8 per cent higher than throughput in the corresponding half-year of 1995.

The tonnage of *non-containerised, general cargo* handled at the five ports increased by 10.1 per cent in July–December 1996 compared with January–June 1996. There were increases in cargo at all ports except Fremantle.

Container traffic (teus) at the five ports increased by 9.5 per cent in July–December 1996 compared with the January–June period. Total teus increased at Brisbane (6.7 per cent), Sydney (10.7 per cent), Melbourne (9.8 per cent), Adelaide (25.8 per cent) and Fremantle (1.9 per cent). Overall for the five ports, there were increases in full import teus (14.9 per cent), full export teus (7.6 per cent) and empty export teus (2.1 per cent), and a marginal decrease in empty import teus (0.1 per cent).

In the calendar year 1996, a total of 2.2 million teus were exchanged at the five ports. This represented a 7.4 per cent increase over the 1995 figure.

The data in table 9 cover all containers handled at the five mainland capital city ports. They include movements at all terminals and multi-purpose berths, whether by lifting or by movement across the ramps of roll-on/roll-off ships. Table 9 therefore provides a more comprehensive measure of container traffic than table 12 which focuses on containers handled at major container terminals in the five ports.

Employment

Comparable data on average total employment over the two periods covered by table 9 are available for four of the port authorities/corporations.

Total employment at these port authorities/corporations (ie excluding Melbourne) fell by 1.3 per cent between January–June 1996 and July–December 1996. Employment declined at Fremantle (4.7 per cent) and Adelaide (4.2 per cent), increased at Brisbane (3.1 per cent) and was unchanged at Sydney.

Ship turnaround time

Data on ship turnaround times in July–December 1996 are available for four of the mainland capital city ports. Information for Fremantle has been delayed due to technical difficulties with the port authority's statistical reporting system.

The median turnaround time for ships calling at container terminals increased at Brisbane, Sydney and Melbourne in July–December 1996 compared with the January–June period. There was a decline at Adelaide. These changes partly reflected the variations in average teu exchanges noted in the earlier discussion of the Port Interface Cost Index.

The indicator of median turnaround time is based on total time in port (usually measured from port boundary to port boundary). It is not directly comparable with the estimated stevedoring time for a 560 teu exchange (based on time between labour first ordered and last labour off the ship) that has also been reported in earlier issues of *Waterline*.

The 95th percentile ship turnaround time declined at Sydney and Adelaide between January–June 1996 and July–December 1996. There were increases at Brisbane and Melbourne. The 95th percentile figure indicates the turnaround time that is equalled or bettered by 95 per cent of ships using a particular port. It provides a partial indicator of the variability of ship turnaround time at each port.

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CREW TO BERTH RATIOS

The shipping industry reform process in Australia has included targets for reductions in the crew to berth ratios for merchant and offshore shipping. As part of this process, the BTCE has been monitoring crew to berth ratios for merchant shipping (since the September quarter 1993) and offshore shipping (since the March quarter 1995).

For the purposes of the monitoring process, the crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship/s operated. Berth days operated is defined as the sum, over the period, of the number of people normally required each day by the relevant statutory authority and the ship operator to be employed in order to carry out the work of the ship/s in a safe and efficient manner.

Issue 9 of *Waterline* described the monitoring process, the methodology used by the BTCE and trends in the ratios up to the end of the September quarter 1996. A key finding was that the targets for reductions in crew to berth ratios had not been achieved.

This article updates the information on crew to berth ratios for Australian merchant and offshore shipping with data for the December quarter 1996.

Merchant shipping

Figure 8 presents data on the crew to berth ratio, and its components, for Australian merchant shipping over the period from the September quarter 1993 to the December quarter 1996.

The overall crew to berth ratio for merchant shipping was 2.247 in the December quarter, up from 2.195 in the September quarter. This was the highest ratio since the beginning of the monitoring process (initial level 2.133). It was well above the reform objective of 2.000.

The 2.4 per cent increase in the December quarter appears to be mainly attributable to additional crew requirements associated with the transfer of several ships between operators. Such transfers usually involve temporary increases in crew numbers while the new crews become familiar with different management practices and ship characteristics. The overall crew to berth ratio for the ship operators that were not involved in ship transfers during the December quarter increased only marginally (by 0.4 per cent) in this period.

Ship time is the largest component of the crew to berth ratio for merchant shipping. The ship time ratio was 1.093 in the December quarter, up from 1.041 in the September quarter (initial level 1.025). This increase appears to mainly reflect the extra crew requirements associated with the transfer of ships between operators.

Accrued leave (formerly called recreation leave in *Waterline*) gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35-hour week. The accrued leave ratio increased to 1.003 in the December quarter from 0.981 in the September quarter (initial level 0.971).

Compensation leave is the third largest component of the crew to berth ratio for merchant shipping. The compensation leave ratio was 0.077 in the December quarter, down from 0.090 in the September quarter (initial level 0.073).

The *long service leave* ratio for the merchant fleet was virtually unchanged at 0.037 in the December quarter 1996 (initial level 0.035).

The remaining components accounted for less than 2 per cent of the overall crew to berth ratio in the December quarter. The *study leave* ratio increased to 0.027 in the December quarter from 0.023 in the September quarter (initial level 0.024). The *training and other paid leave* ratio declined to 0.010 from 0.024 over this period (initial level 0.006).

Table 10 shows the individual components of the crew to berth ratio for the merchant shipping fleet, by crew classification, in the December quarter. Engineers had the highest ratio (2.379) followed by deck officers (2.290), integrated ratings (2.177) and catering crew (2.166).

The ratios for deck officers and engineers in the December quarter were the highest figures recorded for these categories since the monitoring process commenced in the September quarter 1993. The increase appears to be associated with the transfer of ships between operators.

Offshore shipping

Figure 9 presents data on the crew to berth ratio, and its components, for Australian offshore shipping over the period from the March quarter 1995 to the December quarter 1996.

The overall crew to berth ratio for offshore shipping was 2.343 in the December quarter, up marginally from 2.338 in the September quarter. The December quarter ratio was above the figure at the beginning of the monitoring process (initial level 2.327).

Accrued leave (formerly called recreation leave in *Waterline*) is the largest component of the crew to berth ratio for offshore shipping. It comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two-crew duty system, annual leave and time spent travelling in off-duty time. The standard work to leave ratio for offshore shipping is one day's work accrues 1.153 days leave. The accrued leave ratio was 1.153 in the December quarter, down marginally from 1.157 in the September quarter (initial level 1.151).

Ship time reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio was 1.026 in the December quarter, virtually unchanged from the September quarter figure of 1.025 (initial level 1.021).

Compensation leave is the third largest component of the crew to berth ratio for the offshore fleet. The compensation leave ratio increased to 0.116 in the December quarter from 0.104 in the September quarter (initial figure 0.100).

The *long service leave* ratio for the offshore fleet was unchanged at 0.038 in the December quarter (initial level 0.038).

The remaining components accounted for less than 1 per cent of the overall crew to berth ratio in the December quarter. The *study leave* ratio fell to 0.010 in the December quarter from 0.014 in the September quarter (initial level 0.013). The *training and other paid leave* ratio was 0.000 in both periods (initial level 0.003).

Table 11 shows the individual components of the crew to berth ratio for the offshore shipping fleet, by crew classification, in the December quarter. Integrated ratings had the highest ratio (2.404) followed by deck officers (2.320), catering crew (2.288) and engineers (2.276).

Concluding comments

The crew to berth ratio for merchant shipping increased in the December quarter. The increase appears to be mainly attributable to additional crew temporarily required for the transfer of several ships between operators. There was a marginal rise in the overall crew to berth ratio for offshore shipping over the period. Crew to berth ratios for both merchant and offshore shipping remained above the targets agreed as part of the shipping industry reform process in Australia.

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TABLES

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS - CONTAINERS PER HOUR

	Quarter				
Port/indicator	**Dec 1995**	**Mar 1996**	**Jun 1996**	**Sep 1996**	**Dec 1996**
Brisbane					
Crane rate	15.8	17.6	16.7	16.5	16.9
Elapsed rate	17.0	19.0[r]	17.2	17.2[r]	17.4
Net rate	20.6	21.5	20.4	20.4	20.4
Sydney					
Crane rate	15.0	15.6[r]	16.0[r]	16.1[r]	a
Elapsed rate	17.6	18.9[r]	17.6	18.2	a
Net rate	21.0	22.1[r]	22.4	23.3	a
Melbourne					
Crane rate	16.3	17.0	18.4	19.6	17.8
Elapsed rate	18.8	20.2	20.5	21.1	17.9
Net rate	21.9	23.4	25.9[r]	25.6	21.7
Adelaide					
Crane rate	18.8	18.9	18.2	19.3	19.6
Elapsed rate	22.8	23.3	22.0	22.2	22.6
Net rate	23.3	23.8	22.5	22.8	23.1
Fremantle					
Crane rate	16.2	17.9	20.0	17.8	18.2
Elapsed rate	13.4	15.7	14.8	13.4	15.6
Net rate	16.7	18.9	20.0	19.4[r]	20.5
Five ports					
Crane rate	15.9	16.9	17.7	18.0	a
Elapsed rate	17.7	19.3	18.6	19.0	a
Net rate	20.9	22.3	23.4	23.5	a

r ***REVISED TO INCORPORATE AMENDED WEIGHTING FACTORS PROVIDED TO THE BTCE.***

a. Data not available at time of publication.

Sources Patrick, P&O Ports and SeaLand.

BTCE

TABLE 2 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1996

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
LOA (metres)	-	-	-	-	176	176	-	-	-	-
Teus exchanged[a]										
Total	343	377	748	725	675	699	215	206	281	291
Loaded	264	292	620	600	570	590	168	161	231	242
Empty	79	85	128	125	105	109	47	45	50	49
Loaded inwards	92	124	390	375	-	-	59	56	-	-
Loaded outwards	172	168	230	225	-	-	109	105	-	-
Primary produce	-	-	-	-	-	-	33	41	-	-
Ship call parameters[a]										
Number of port calls	3	3	3	3	3	3	3	4	5	5
Elapsed berth time (hrs)	22	23	41	41	33	35	15	15	22	20

- not required.

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

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

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TABLE 3 PORT AND RELATED CHARGES, 1996

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996
Ship-based charges ($/teu)										
Conservancy	9.19	8.35	-	-	-	-	6.98	7.31	2.82	2.72
Tonnage	-	-	10.59	9.73	10.20	9.85	17.18	18.10	9.01	8.69
Pilotage	14.96	13.60	4.55	4.69	8.13	7.85	10.91	11.43	7.83	7.56
Towage	29.52	26.84	13.07	13.48	10.89	10.52	57.12	59.83	40.16	38.74
Mooring & unmooring	4.20	3.82	4.21	4.34	4.22	3.18	-	-	3.92	3.78
Berth hire[a]	-	-	-	-	11.61	12.00	-	-	-	-
Total[b]	57.87	52.61	32.41	32.25	45.05	43.40	92.19	96.67	63.74	61.49
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	46.75	37.40	65.00	65.00	49.79	49.79
Exports	26.00	26.00	45.00	45.00	46.75	37.40	62.00	61.09	49.79	49.79
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	14.63	14.63
Total port and related charges ($/teu)[b]										
Loaded imports	125.87	120.61	92.41	92.25	91.80	80.80	157.19	161.67	128.16	125.91
Loaded exports	125.87	120.61	77.41	77.25	91.80	80.80	154.19	157.77	128.16	125.91
Charges per ship visit ($/visit)										
Total ship-based charges	19840	19840	24241	23380	30411	30330	19853	19873	17902	17902
Empty teus[c]	1126	1211	3200	1250	1428	1186	0	0	405	397

- not applicable.

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

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

c. 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 2.

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

BTCE

TABLE 4 PORT INTERFACE COSTS, 1996

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996
Imports										
Ship-based charges	58	53	32	32	45	43	92	97	64	61
Cargo-based charges	68	68	60	60	47	37	65	65	64	64
Stevedoring[p]	203	203	203	203	203	203	203	203	203	203
Customs brokers' fees	121	121	153	154	138	138	135	134	135	136
Road transport charges	175	174	290	287	246	248	155	156	185	188
Total imports[a]	625	619	739	737	679	670	650	654	651	654
Exports										
Ship-based charges	58	53	32	32	45	43	92	97	64	61
Cargo-based charges	68	68	45	45	47	37	62	61	64	64
Stevedoring[p]	203	203	203	203	203	203	203	203	203	203
Customs brokers' fees	79	79	108	110	89	89	71	71	71	74
Road transport charges	175	174	290	287	246	248	155	156	185	188
Total exports[a]	582	576	678	677	630	621	583	588	588	591

p Provisional pending updating of stevedoring figures provided by the ACCC which is the only official national source of stevedoring charges in Australia.

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

Note Based on parameters described in table 2.

Sources BTCE 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; and stevedoring charges data supplied by the ACCC.

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TABLE 5 THE NATIONAL PORT INTERFACE COST INDEX

($/teu)

	Jul-Dec 1992	Jan-Jun 1993	Jul-Dec 1993	Jan-Jun 1994	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1995	Jan-Jun 1996	Jul-Dec 1996
Imports	696	675	670	690	684	697	696	689	684
Exports	617	608	612	633	624	633	636	633	629

Sources *BTCE 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; and stevedoring charges data supplied by the ACCC.*

BTCE

TABLE 6 PORT AND RELATED CHARGES AT BURNIE, 1996

	Jan-Jun 1996	Jul-Dec 1996
Ship-based charges ($/teu)		
Conservancy	-	-
Tonnage	2.05	2.19
Pilotage	2.09	2.21
Towage	14.74	14.88
Mooring & unmooring	0.39	0.70
Berth hire	-	-
Total[a]	19.27	19.98
Cargo-based charges ($/teu)		
Wharfage		
Imports	105.45	110.75
Exports	54.35	57.35
Harbour dues	-	-
Berth charge	-	-
Total port and related charges ($/teu)		
Loaded imports	124.72	130.73
Loaded exports	73.62	77.33
Charges per ship visit ($/visit)		
Total ship-based charges	8833	9073
Empty teus[b]	2730	2831

- not applicable

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

b. Estimated by multiplying cargo-based charges per empty teu (ie wharfage) by average exchange of empty teus.

Sources *BTCE estimates based on ship call data supplied by port authority, and price schedules of port authority and towage operator.*

BTCE

TABLE 7 PORT INTERFACE COSTS AT BURNIE, 1996

($/teu)

	Jan-Jun 1996	Jul-Dec 1996
Imports		
Ship-based charges	19	20
Cargo-based charges	105	111
Stevedoring[p]	203	203
Customs brokers' fees[a]	118	118
Road transport charges	90	90
Total imports[b]	536	542
Exports		
Ship-based charges	19	20
Cargo-based charges	54	57
Stevedoring[p]	203	203
Customs brokers' fees[a]	81	81
Road transport charges	90	90
Total exports[b]	448	452

p Provisional pending updating of stevedoring figures by the ACCC.

a. To protect the confidentiality of figures for Burnie operators, customs brokers' fees are an average for customs brokers at several Tasmanian ports.

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

Sources BTCE estimates based on: ship call data provided by port authority; price schedules of port authority and towage operator; survey of customs brokers and road transport operators; and stevedoring charges data supplied by the ACCC.

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TABLE 8 FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORT AUTHORITIES/CORPORATIONS, 1994/95 & 1995/96

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	**1994/95**	**1995/96**	**1994/95**	**1995/96**	**1994/95**	**1995/96**	**1994/95[f]**	**1995/96**	**1994/95**	**1995/96**
					per cent					
Return on assets[a]	7.9	5.8	18.2	15.8	15.9	e	1.0	-23.6[g]	15.7[i]	14.6
Dividend payout ratio[b]	33.0	38.8	51.4	56.5	32.9	e	-171.5	-7.8[g]	0.0	0.0
Debt/equity[c]	0.0	0.1	28.3	109.3	117.0	e	112.6	133.0	h	1490.2
					$ million					
EBIT[d]	29.0	22.6	62.3	49.8	83.6	e	1.9	-32.0[g]	14.5[i]	14.5
Average total assets in service	368.8	390.5	341.6	314.5	525.0	e	182.5	135.2	91.9	99.1
Dividends paid	9.6	5.8	21.1	15.1	12.0	e	3.7	3.4	0.0	0.0
Operating profit[d]	29.0	15.0	41.1	26.8	36.4	e	-2.2	-43.3[g]	7.8[i]	8.3
Total debt	0.0	0.4	60.7	150.0	236.9	e	72.1	65.5	63.6[i]	54.5
Total equity	353.5	375.6	214.3	137.2	202.5	e	64.0	49.2	-19.9	3.7

a. EBIT as a proportion of total assets. EBIT is earnings before interest and tax.

b. Dividends paid out as a proportion of operating profit.

c. Total debt as a proportion of total equity.

d. Includes abnormals.

e. The Melbourne Port Corporation commenced operation on 1 March 1996 as port landlord, being one of three entities taking over the functions of the former Port of Melbourne Authority. Thus consistent financial data are not available for the 12 month period ending 30 June 1996.

f. Covers Ports Corp South Australia over its initial 6 months of operation from 5 January 1995 to 30 June 1995. 1994/95 data in Waterline 6 were a consolidation of the Department of Marine & Harbors and Ports Corp South Australia for the full financial year.

g. Industry Commission definitions used in Waterline include abnormal items. 1995/96 figures for Adelaide include abnormals of -$49.3 million which relate to a write-down in asset values to accommodate a change in accounting policy to use deprival values. EBIT before abnormals was $17.3 million, operating profit after tax and before abnormals was $6.0 million and return on assets before abnormals was 12.8 per cent in 1995/96.

h. Calculation of debt/equity not appropriate as the Fremantle Port Authority had negative equity in 1994/95 in terms of the definitions used in Waterline.

i. Figure revised in line with amendments to State Treasurer's Instructions.

Note Accounts are based on historic costs.

Source AAPMA.

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TABLE 9 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1996

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five Ports[c]	
	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1996	Jul-Dec 1996
Total cargo throughput ('000 tonnes)	9575	9449	10268	10851	9025	9271	2616	2867	11330	10056	42815	42494
Non-containerised general cargo ('000 tonnes)[a]	332	374	382	414	933	1071	133	151	380	369	2159	2378
Containerised cargo (teus exchanged)												
Full import	39286	44765	167875	192764	193089	222273	9004	12144	41908	46610	451162	518556
Empty import	24942	22918	10170	10304	36082	37955	6030	8239	12165	9857	89389	89273
Full export	55527	60295	107105	116017	186167	201630	19167	22959	44661	42936	412627	443837
Empty export	7491	7774	51809	54032	43884	42350	1567	1668	6994	8315	111745	114139
Total teus	127246	135752	336959	373117	459222	504208	35768	45010	105728	107718	1064923	1165805
Average total employment	229	236	243	243	287[d]	69[e]	214	205	213	203	1186	na
Turnaround time (hrs)[b]												
Median result	26.8	31.6	39.0	41.0	35.8	38.0	20.2	18.5	28.4	na	-	-
95th percentile	48.0	51.3	75.7	73.9	69.6	77.9	48.1	38.8	75.8	na	-	-

- *not applicable*

na *not available*

a. *Excludes bulk cargoes.*

b. *Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.*

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

d. *Incorporates Melbourne Port Corporation, Melbourne Port Services Pty Ltd and Port of Melbourne Authority (Shell) employees. Victorian Channels Authority employees are not included. Figure is the total as at 30 June 1996, not an average for the six-month period.*

e. *This figure applies to Melbourne Port Corporation only; ie. excludes Melbourne Port Services Pty Ltd and Port of Melbourne Authority (Shell) employees.*

Source *AAPMA.*

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TABLE 10 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1996

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.137	1.018	0.016	0.037	0.040	0.042	2.290
Engineers	1.173	1.048	0.037	0.039	0.078	0.005	2.379
All officers	1.155	1.033	0.027	0.038	0.059	0.023	2.336
Integrated ratings	1.045	0.982	0.115	0.036	0.000	0.000	2.177
Catering crew	1.033	0.967	0.130	0.035	0.000	0.000	2.166
All ratings	1.041	0.978	0.119	0.036	0.000	0.000	2.174
All crew	1.093	1.003	0.077	0.037	0.027	0.010	2.247

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

Source Data provided by ship operators.

BTCE

TABLE 11 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1996

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.046	1.153	0.073	0.038	0.010	0.000	2.320
Engineers	1.012	1.153	0.042	0.037	0.031	0.000	2.276
All officers	1.030	1.153	0.058	0.038	0.020	0.000	2.299
Integrated ratings	1.018	1.153	0.193	0.039	0.000	0.000	2.404
Catering crew	1.037	1.153	0.060	0.037	0.000	0.000	2.288
All ratings	1.022	1.153	0.170	0.039	0.000	0.000	2.384
All crew	1.026	1.153	0.116	0.038	0.010	0.000	2.343

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

Source Data provided by ship operators.

BTCE

TABLE 12 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS - TEUS PER HOUR

	Mar-92	Jun-92	Sep-92	. . . . .	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96
Brisbane																		
Ships handled	85	96	93	na	106	111	112	140	140	187	136	123	135	132	124	133	140	141
Total teus	28235	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	39037[r]	51008[r]	66115[r]	62904
Crane rate	17.0	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.6[r]	20.6
Elapsed rate	19.6	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.5[r]	20.5	20.9[r]	21.1
Net rate	21.1	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.9
Sydney																		
Ships handled	105	109	112	na	205	238	177	240	223	221	218	202	192	203	206	216	228	a
Total teus	71702	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	146038[r]	148290[r]	156344[r]	a
Crane rate	18.6	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.5[r]	19.9[r]	20.3[r]	a
Elapsed rate	19.9	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.8[r]	22.1[r]	23.1	a
Net rate	26.3	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	28.0[r]	27.9[r]	29.5	a
Melbourne																		
Ships handled	108	121	121	na	235	306	211	265	267	244	265	228	221	227	228	262	274	282
Total teus	73441	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	162911[r]	170884[r]	203371[r]	202376
Crane rate	16.7	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3	24.5	22.4
Elapsed rate	19.2	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0	26.5[r]	22.1
Net rate	22.1	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.7[r]	32.2[r]	27.2
Adelaide																		
Ships handled	22	20	21	na	21	26	28	34	31	33	35	50	34	42	47	63	70	74
Total teus	10810	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	23351
Crane rate	19.8	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	24.0
Elapsed rate	27.2	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	27.7
Net rate	28.2	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	28.3
Fremantle																		
Ships handled	71	75	72	na	116	115	127	135	121	124	128	136	139	124	143	153	159	161
Total teus	25403	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	47597[r]	51113[r]	50791[r]	55593
Crane rate	21.0	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4	20.8	21.5
Elapsed rate	16.8	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.3[r]	17.6[r]	16.0	18.6
Net rate	21.0	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5	22.6[r]	24.2
Five Ports																		
Ships handled	391	421	419	na	683	796	745	814	782	809	782	739	721	728	748	827	871	a
Total teus	209591	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	411538[r]	440098[r]	497140[r]	a
Crane rate	18.0	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.3[r]	22.3	a
Elapsed rate	19.4	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6	23.6	a
Net rate	23.3	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	27.1[r]	28.5	29.1	a

na not available

a. Data not available at time of publication.

r Revised to incorporate amended traffic data (weighting factors) provided to the BTCE.

Notes 1. To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993.

2. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.

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INDEX OF WATERLINE ARTICLES—ISSUES 1 TO 9

Subject	Issue	Date	Pages	Coverage of article[a]
Coal ports in Australia	6	March 1996	10–13	Ports, terminals, capacity and operational changes, performance
Comparing port charges—methodology	4	October 1995	9–11	Teu exchanges and comparisons of port charges
Crew to berth ratios	9	December 1996	7–11	Recent trends for Australian merchant and offshore shipping
Distribution of benefits of waterfront reform	3	May 1995	11–14	Stevedoring, ship operators, importers, exporters
International comparisons of waterfront performance	4	October 1995	11–13	Overview of recent work
	5	December 1995	9–11	New Zealand ports
	6	March 1996	13–16	Asian ports
	7	June 1996	12–14	European ports
	8	September 1996	14	New Zealand (timber & steel coil)
Liner shipping	5	December 1995	11–13	Conference/non-conference shares in Australian trades to 1994/95
Non-containerised general cargo	8	September 1996	11–14	Cargoes, ships, ports, stevedoring, performance data
Port authority financial performance	1	July 1994	4–6	1992/93
	3	May 1995	5–6	1993/94
	6	March 1996	7–9	1994/95
Port charging—structures and terminologies	9	December 1996	11–13	Australia's six largest container ports
Port Interface Cost Index	1	July 1994	2–5	July–December 1993
	2	December 1994	2–5	January–June 1994
	3	May 1995	2–5	July–December 1994
	5	December 1995	2–5	January–June 1995
	7	June 1996	6–9	July–December 1995
	8	September 1996	6–9	January–June 1996
Port non-financial performance	1	July 1994	4–6	July–December 1993
	2	December 1994	5, 9	January–June 1994
	3	May 1995	6–7	July–December 1994
	6	March 1996	8–9	January–June 1995
	7	June 1996	10–11	July–December 1995
	8	September 1996	10–11	January–June 1996
Reliability	6	March 1996	6–7	Stevedoring industrial disputes
	7	June 1996	11–12	Concepts and available data
	9	December 1996	6–7	Proposed indicators
Stevedoring performance[b]	1	July 1994	5–11	December quarter 1993
	2	December 1994	6–11	March & June quarters 1994
	3	May 1995	7–11, 15	September & December quarters 1994
	4	October 1995	2–9, 15	March & June quarters 1995
	5	December 1995	5–9, 15	September quarter 1995
	6	March 1996	2–7, 19	December quarter 1995
	7	June 1996	2–6, 15	March quarter 1996
	8	September 1996	2–5, 15	June quarter 1996
	9	December 1996	2–5, 15	September quarter 1996

a. Period is latest quarter or half-year covered. Articles may also include earlier data.

b. For earliest available data on stevedoring performance (from December quarter 1989), see issue 1 (table 7) or issue 2 (table 6).

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FIGURES

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE – TEUS PER HOUR

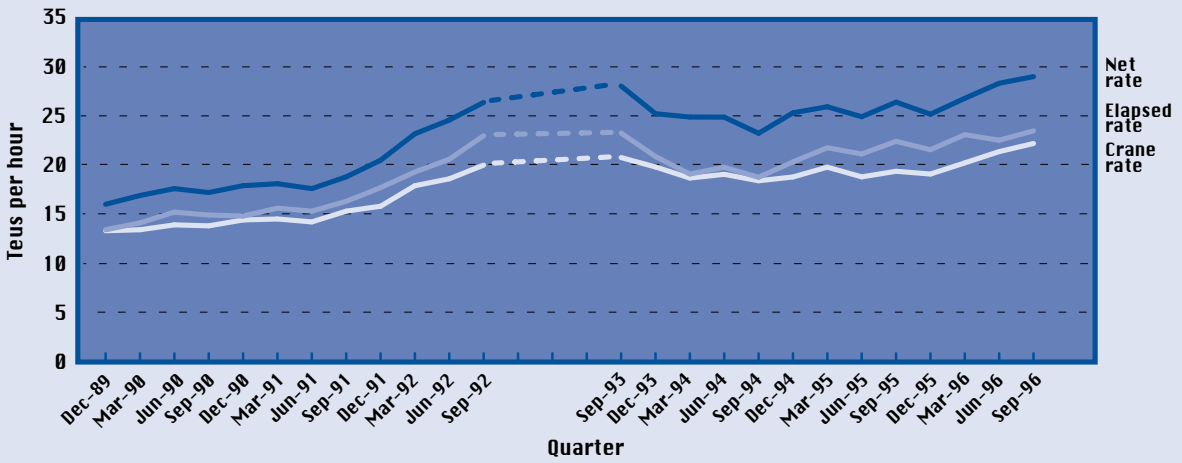
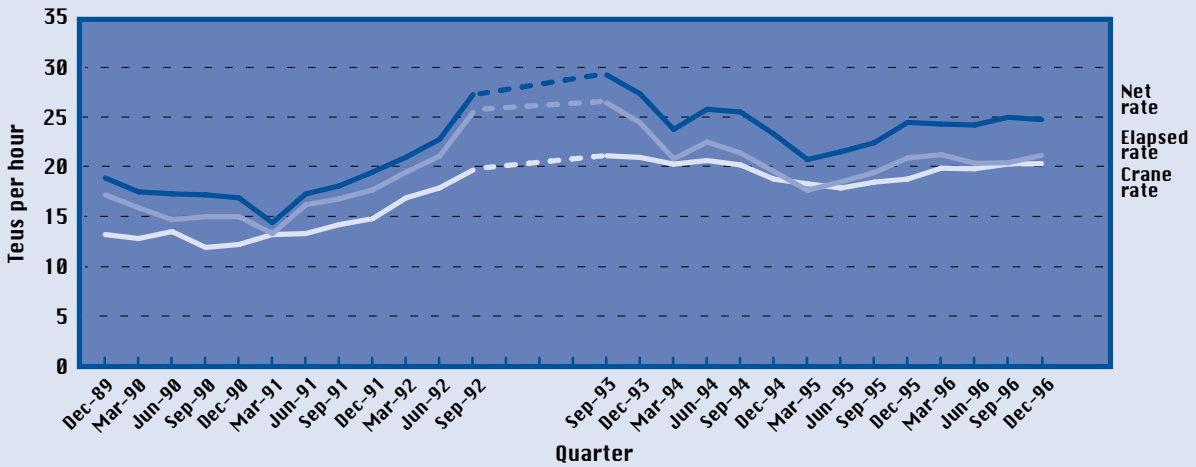


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR

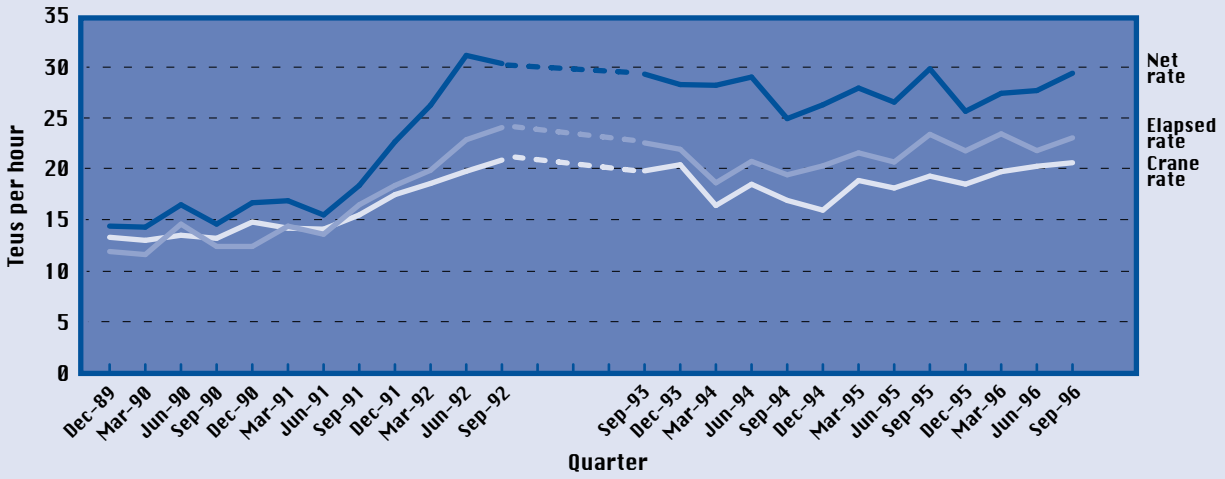
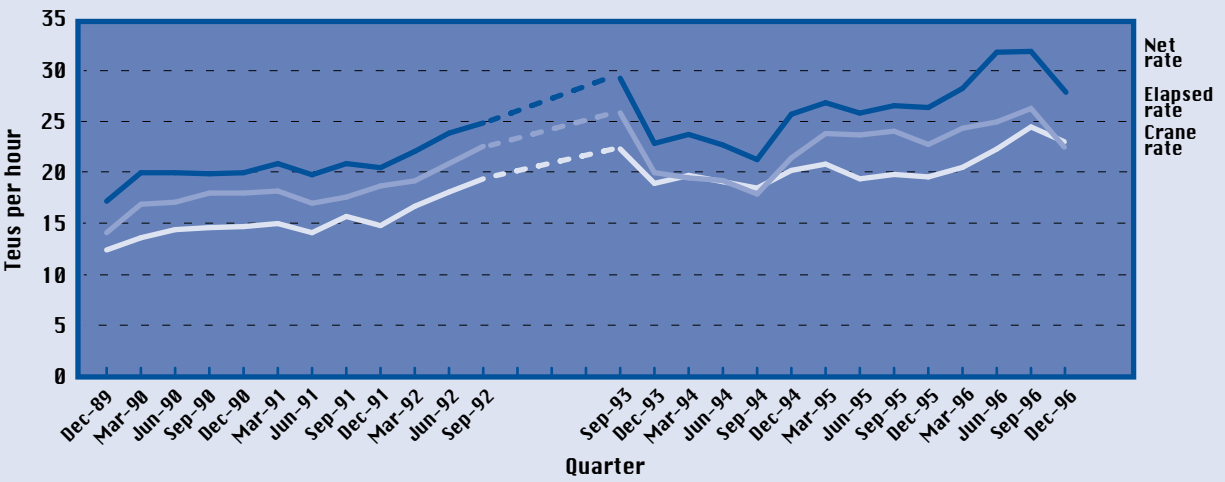


FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE – TEUS PER HOUR

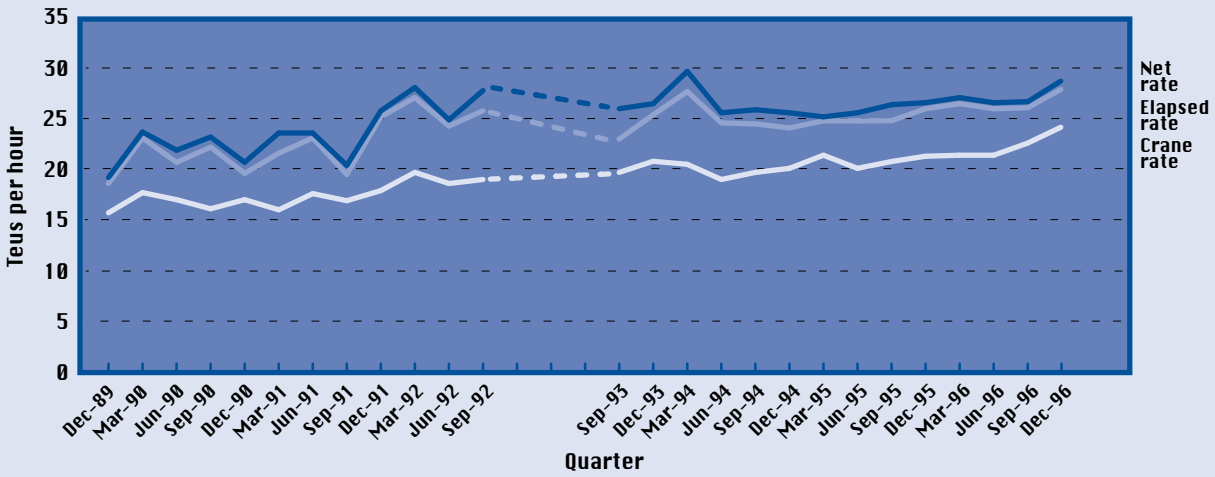
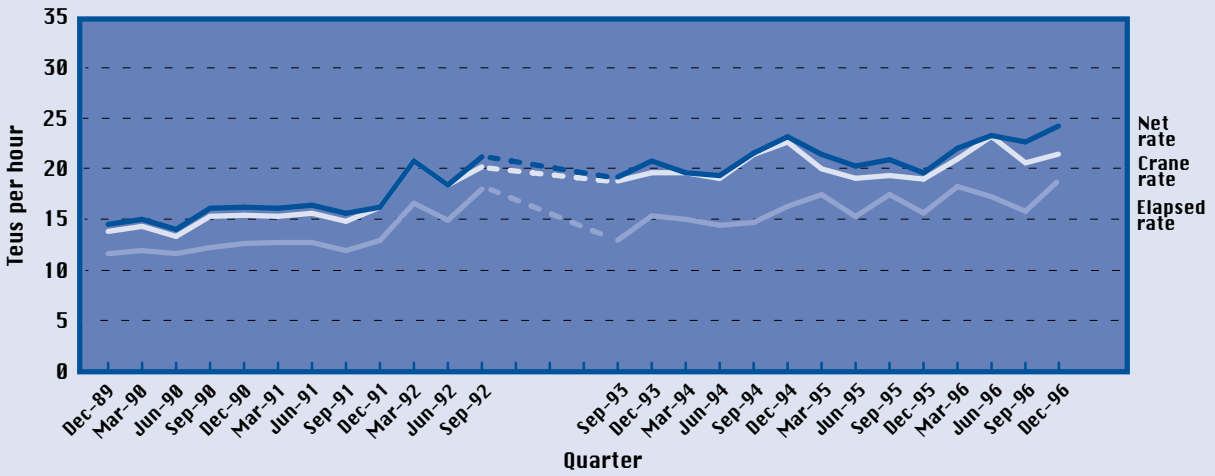


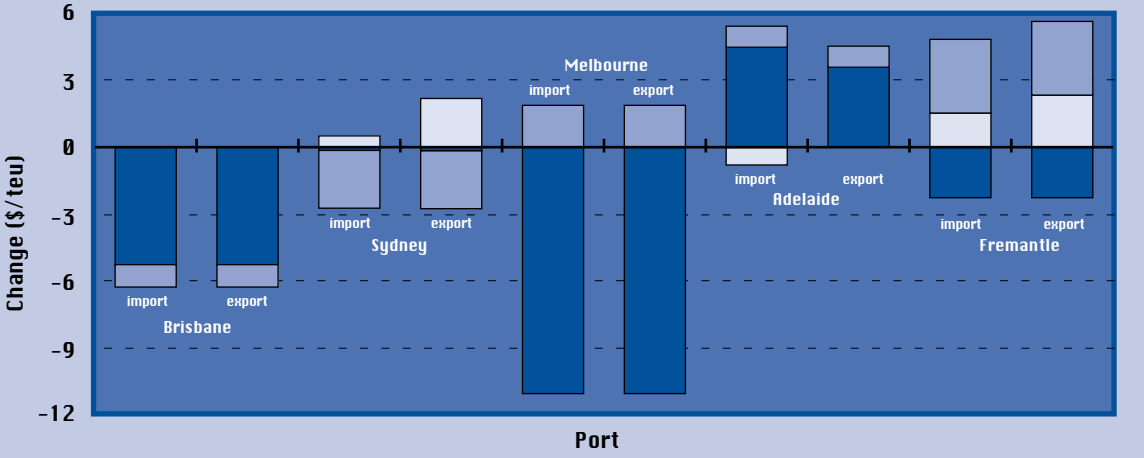
FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR



Notes *To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 7 SOURCES OF CHANGES IN PORT INTERFACE COSTS FOR INDIVIDUAL PORTS, JANUARY–JUNE 1996 TO JULY–DECEMBER 1996



Sources *BTCE 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; and stevedoring charges data supplied by the ACCC.*

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

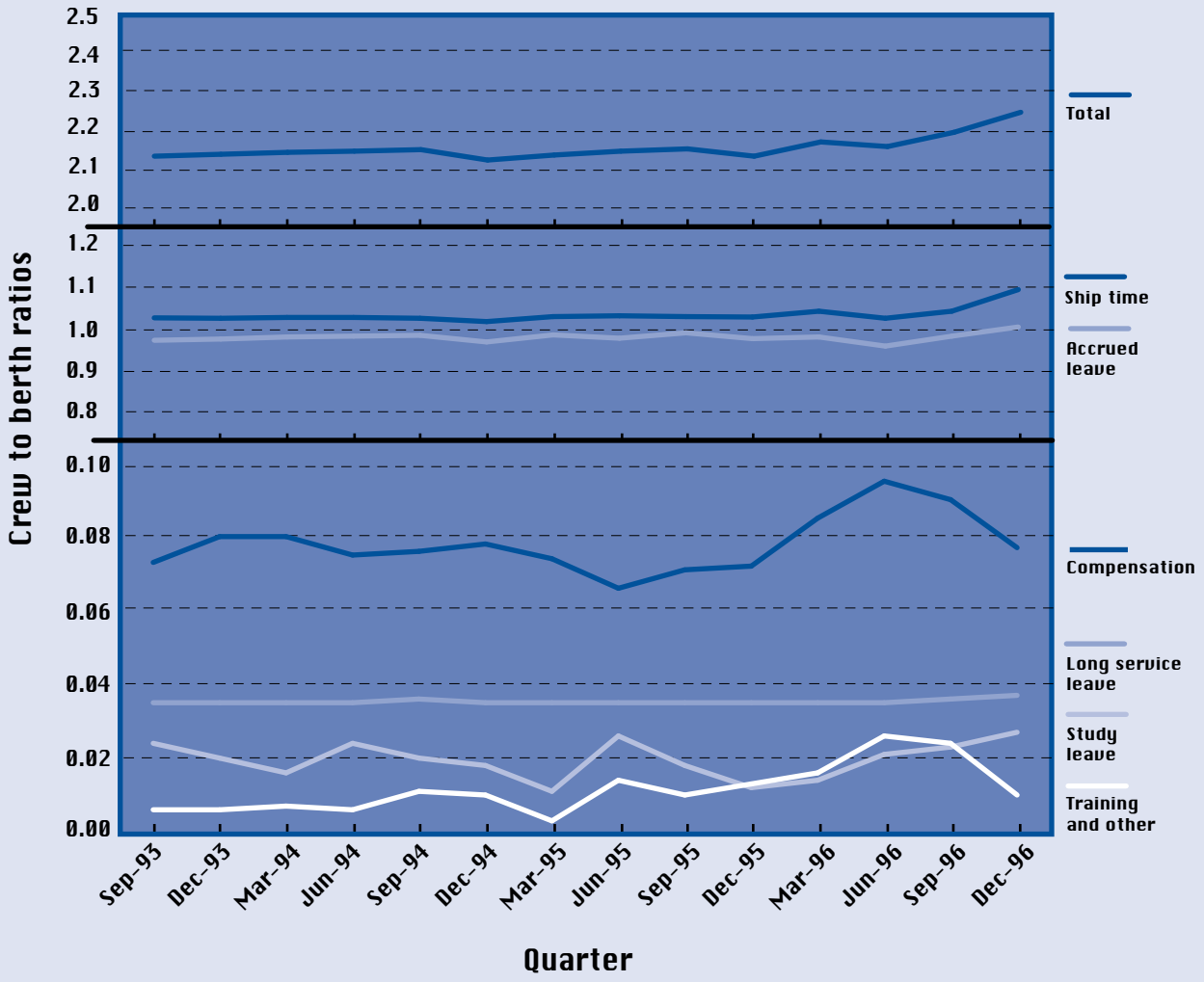
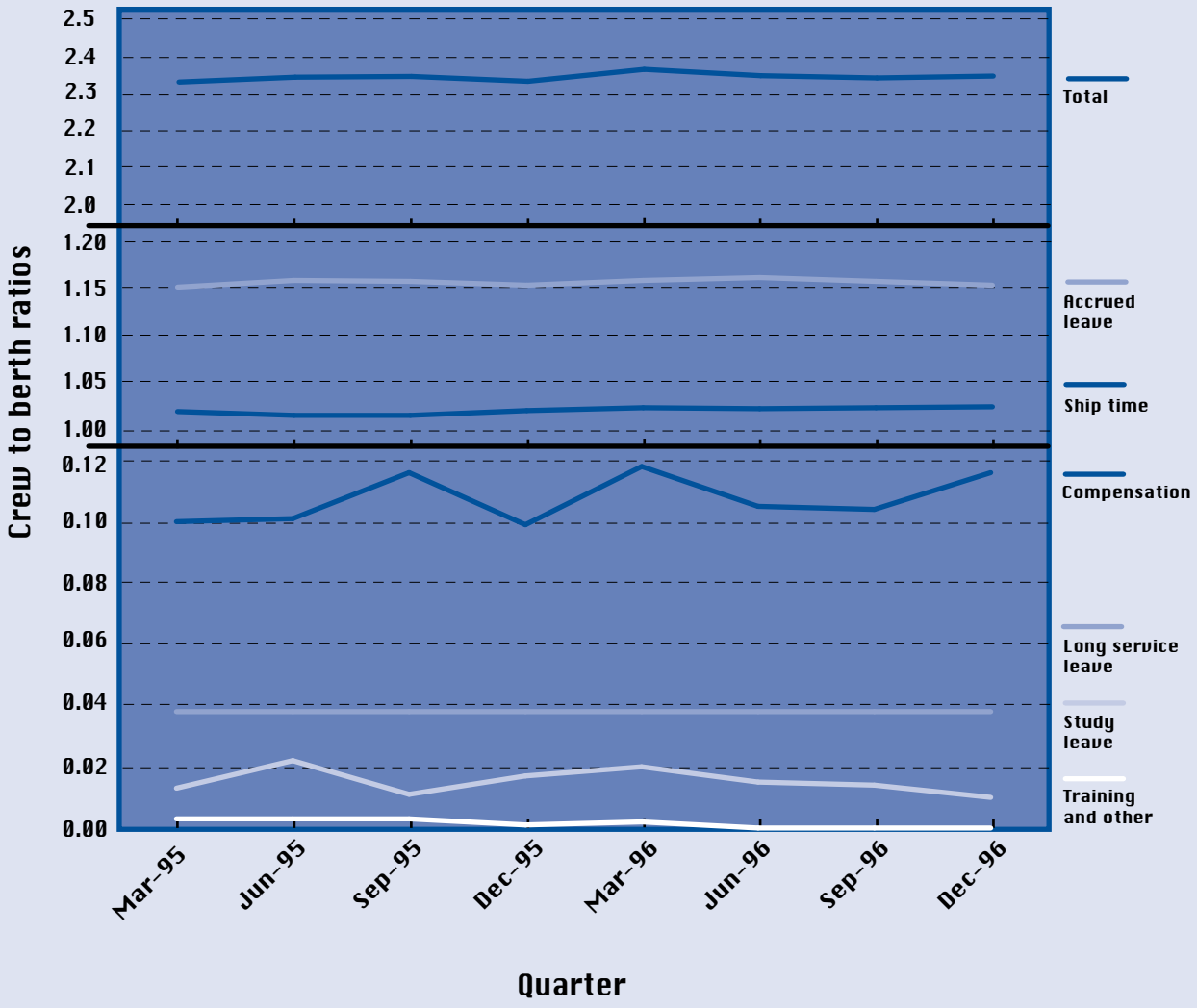


FIGURE 9 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING



WATERLINE
March 1997, Issue no. 10

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ACCC	Australian Competition and Consumer Commission
BTCE	Bureau of Transport and Communications Economics
COSCO	China Ocean Shipping Company
GRT	Gross Registered Tonnage
LOA	Length Overall
MISC	Malaysian International Shipping Corporation
MOL	Mitsui OSK Lines
NRT	Net Registered Tonnage
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time the ship is alongside the berth offering for work whether worked or not, measured from labour first ordered to last labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per crane per net hour.

Crane intensity—the average number of cranes used to work the ship.

ACKNOWLEDGMENTS

Contributors to this issue of *Waterline* were Kym Starr, Stephen Wheatstone and Gita Curnow. The BTCE is particularly grateful for the assistance of the Maritime Division of the Department of Transport and Regional Development, the Association of Australian Ports and Marine Authorities, individual port authorities, the ship operators that provided data for the crew to berth ratios, the customs brokers and road transport operators that responded to the BTCE's survey of fees and charges, and the stevedoring companies Patrick, P&O Ports and SeaLand.

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AUSTRALIA

WATERLINE

JUNE 1997 ISSUE NO. 11

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This issue of *Waterline* includes our regular articles on stevedoring productivity and crew to berth ratios. An article on waterfront reliability presents the first data for a new quarterly series.

The performance indicators in *Waterline* are prepared from data provided by industry. As the underlying information systems have usually been developed to meet the needs of individual operators, additional work is often required to prepare indicators that are consistent between operators and over time. This work can require significant time and resources, particularly where there are changes in operators' information systems (eg following company mergers) or in workplace arrangements. The BTCE is grateful for the assistance of the many industry participants who provide data for *Waterline*.

The recent introduction of upgraded information systems by one terminal operator has resulted in some changes to the *Waterline* data on elapsed rates and net (ship) rates. The affected indicators, which start from the March quarter 1997, are clearly identified in the stevedoring productivity article in this issue.

Stephen Hunter
Director

IN BRIEF

Stevedoring productivity

The five-port average crane rate was 17.4 containers per hour in the March quarter compared with 17.1 containers per hour in the December quarter. Crane rates increased at Brisbane (17.3 containers per hour), Melbourne (19.0 containers per hour) and Fremantle (19.4 containers per hour). There was a decline at Sydney (14.9 containers per hour). Adelaide's crane rate was unchanged (19.6 containers per hour).

Most of the December quarter figures for Sydney, which were not available for the previous issue of *Waterline*, have now been received. The data indicate that the five-port average crane rate declined to 17.1 containers per hour in the December quarter from 18.0 containers per hour in the September quarter.

Waterfront reliability

The BTCE has received the first data for the new quarterly series on waterfront reliability, covering container traffic at the five mainland capital city ports.

During the March quarter, a berth was available within four hours of the booked time for 92 per cent of ship calls. Availability of pilotage and towage services within one hour of the booked time was 100 per cent.

Initial data for several ports indicate that there is significant inter-port variation for the three stevedoring indicators – cargo receival, stevedoring completion and stevedoring rate. The availability of time-series data in subsequent quarters will facilitate the analysis of stevedoring reliability, although differences in operational conditions appear to contribute to some of the inter-port variation.

Crew to berth ratios

The crew to berth ratio for merchant shipping declined to 2.174 in the March quarter. However, the ratio was still above the level recorded at the beginning of the monitoring process in the September quarter 1993 (initial level 2.133).

The crew to berth ratio for offshore shipping increased to 2.373 in the March quarter. This was the highest figure for offshore shipping since the beginning of the monitoring process in the March quarter 1995 (initial level 2.327)

WATERLINE
June 1997, Issue no. 11

STEVEDORING PRODUCTIVITY

Table 1 presents information on stevedoring productivity at Australia's major container terminals over the period to the end of the March quarter 1997. The indicators are expressed in containers per hour which provides the most rigorous basis for productivity comparisons. The teu-based data, which are retained in *Waterline* for the purposes of long-term historical comparison, are presented in figures 1 to 6 and table 6.

The stevedoring productivity data for Brisbane, Sydney, Melbourne and Fremantle are averages for the terminals operated by P&O Ports and Patrick at each port. The Adelaide data cover the SeaLand terminal.

Factors affecting the indicators

The recent introduction of upgraded information systems by one terminal operator has resulted in some changes to the company's data on elapsed rates and net (ship) rates from the March quarter 1997. The changes reflect improvements in data recording and processing, including more accurate application of the definitions for these two indicators.

As a result of the changes implemented by the terminal operator, the elapsed rates and net rates for the March quarter 1997 are not directly comparable with the preceding data for these indicators. This involves the five-port averages and the data for Brisbane, Sydney, Melbourne and Fremantle. The Adelaide data are not affected.

The available information suggests that the impact of the data changes has been to reduce the five-port average figures for the elapsed and net (ship) rates in table 1 by around one container per hour. The availability of more accurate data from the terminal operator has also affected the figures for ships handled and total teus (table 6).

In view of the changes to the terminal operator's data, the commentary in this issue of *Waterline* does not cover quarterly changes in elapsed rates or net rates at any ports except Adelaide. Quarterly comparisons of these rates will recommence in the September issue of *Waterline*.

Crane rates, which provide the principal indicator of stevedoring productivity in *Waterline*, are not affected by the changes to the terminal operator's data. The commentary in this article therefore includes comparisons of March and December quarter crane rates for all ports.

In a separate development, the Melbourne stevedoring indicators in *Waterline* no longer include Webb Dock since there has been a change in the way this facility is being operated by Patrick. Webb Dock is being developed to focus on roll-on/roll-off and breakbulk activities whereas the *Waterline* indicators cover lift-on/lift-off ships. Most of the lift-on/lift-off container traffic at Webb Dock is being transferred to the Swanson Dock terminals. The removal of Webb Dock affects the March quarter data for ships handled and total teus at Melbourne (table 6).

This issue of *Waterline* includes the December quarter five-port averages and Sydney figures for the crane rate and the net rate. These indicators were not published in the March issue due to delays in receiving key Sydney data. The five-port average and Sydney figures for the elapsed rate in the December and March quarters were not available at the time of publication of the current issue due to continuing problems with the computer system at one of the Sydney terminals.

Five-port average

The five-port average *crane rate* (productivity per crane while the ship is worked) was 17.4 containers per hour in the March quarter, compared with 17.1 containers per hour in the December quarter.

This followed a decline in the previous period. The five-port average crane rate fell to 17.1 containers per hour in the December quarter from 18.0 containers per hour in the September quarter.

The five-port average *net rate* (total productivity while the ship is worked) was 21.3 containers per hour in the March quarter. Information on the five-port average *elapsed rate* (productivity based on the time labour is aboard) was not available at time of publication due to the absence of Sydney data.

Brisbane

The crane rate at Brisbane increased to 17.3 containers per hour in the March quarter from 16.9 containers per hour in the December quarter.

In the March quarter, the net rate was 19.4 containers per hour and the elapsed rate was 17.3 containers per hour. The proportion of time not worked at Brisbane averaged 10.8 per cent over the quarter.

Sydney

Sydney's crane rate declined to 14.9 containers per hour in the March quarter from 15.4 containers per hour in the December quarter.

The decline in the March quarter followed a fall in the previous period. The crane rate of 15.4 containers per hour in the December quarter was down from 16.1 containers per hour in the September quarter.

In the March quarter, the net rate at Sydney was 20.0 containers per hour. Data on the elapsed rate were not available at time of publication.

Melbourne

Table 1 indicates that the crane rate at Melbourne increased to 19.0 containers per hour in the March quarter from 17.8 containers per hour in the December quarter. A small part of this reported increase was probably attributable to the removal of Webb Dock from the series.

In the March quarter, Melbourne's net rate was 23.0 containers per hour and the elapsed rate was 19.5 containers per hour. The proportion of time not worked at Melbourne averaged 15.3 per cent over the quarter.

Adelaide

Adelaide's crane rate was 19.6 containers per hour in the March quarter, the same as the figure in the December quarter.

The net rate rose to 24.6 containers per hour, from 23.1 containers per hour in the previous quarter. Adelaide's elapsed rate was 24.0 containers per hour in the March quarter, up from 22.6 containers per hour in the December quarter.

Adelaide continued to have a very low proportion of time not worked. The average proportion of elapsed time not worked was 2.4 per cent in the March quarter, similar to the figure of 2.2 per cent in the previous quarter.

Fremantle

At Fremantle, the crane rate increased to 19.4 containers per hour in the March quarter from 18.2 containers per hour in the December quarter.

In the March quarter, the net rate was 20.6 containers per hour and the elapsed rate was 16.2 containers per hour. The proportion of elapsed time not worked at Melbourne averaged 21.5 per cent over the quarter.

Teus per hour

Figures 1 to 6 and table 6 present the stevedoring indicators in terms of teus per hour over the period from the WIRA process. They cover the same ship calls as the containers per hour data in table 1.

The changes in crane rates indicated by the teu-based measures in the March quarter were generally in the same direction as the changes indicated by the container-based measures. The only differences were at Brisbane and Adelaide where there were significant changes in the mix of 20 foot and 40 foot containers compared with the previous quarter.

WATERLINE
June 1997, Issue no. 11

WATERFRONT RELIABILITY

Issue 9 of *Waterline* presented the proposed reliability indicators that have been developed by the BTCE in consultation with major industry participants. The indicators will provide a basis for monitoring changes over time and for analysing factors affecting reliability at Australia's major container ports.

Table 2 describes the current indicators of waterfront reliability. The category of linesmen, which was included in the proposed indicators reported in *Waterline* 9, has been deleted due to a lack of adequate data.

This article presents the initial information on waterfront reliability for container traffic at the five mainland capital city ports. The detailed data cover berth availability, pilotage and towage. Information on several aspects of stevedoring is also provided. It is anticipated that the indicators will be further developed in future issues of *Waterline*.

Ship arrival

Issue 9 of *Waterline* presented two indicators for ship arrival at port (aspect 1 in table 2). These indicators measure the extent to which ships achieve the expected arrival times advised to the providers of port services. If there is significant variation between actual and advised arrival times, it is more difficult for operators to provide port services at the times required by the shipping lines.

Data on ship arrival at port are currently being obtained from individual port authorities / corporations through the AAPMA. Collection of the data has been affected by variations in the recording and data extraction arrangements of individual port authorities / corporations. It is anticipated that indicators for four of the five mainland capital city ports will be published in the next issue of *Waterline*.

Berth availability, pilotage, towage

Nine shipping lines have supplied information on berth availability, pilotage and towage (aspects 2 to 4 in table 2). The lines generally provided the data using a standard reporting form. The BTCE also contacted most of the lines to ensure that the data for publication were consistent with the definitions specified for the indicators.

Table 3 summarises the information on berth availability, pilotage and towage for the March quarter 1997. The data cover a total of 208 ship calls, mainly involving lift-on/lift-off container ships operating in the Europe, South-East Asia and North America trades.

The 208 ship calls are equivalent to 24 per cent of all calls at the container terminals in the five ports during the March quarter. The proportion of ship calls at individual ports ranged from 10 per cent at Brisbane to 38 per cent at Adelaide. This inter-port variation reflects the schedules and operations of the lines which responded to the request for data. The BTCE is working to improve the coverage of the three indicators by approaching additional lines for data.

Table 3 indicates that a berth was available within four hours of the booked time for around 92 per cent of the ship calls covered by the lines' data. It appears that the major factor contributing to delays was occasional congestion at several ports.

Table 3 shows that availability of pilotage and towage services within one hour (plus or minus) of the booked time was 100 per cent in the March quarter.

Stevedoring

The BTCE has received data on stevedoring (aspects 5 to 7 in table 2) from P&O Ports and Patrick. One operator's data cover the September and December quarters 1996, and the other operator's data are for the March quarter 1997.It is anticipated that more detailed information from these two operators, for the March or June quarter 1997, will be published in the September issue of *Waterline*.

The initial data involve container terminals at Brisbane, Sydney, Melbourne and Fremantle. However, one operator's information on stevedoring completion is currently limited to two of these ports due to the scope of its data collection system. In addition, the coverage of the initial data for individual operators was limited (on a one-off basis) by computing problems at Sydney (cargo receival and stevedoring rate) and by operational issues at Melbourne (stevedoring completion).

As a result of these factors, the information for the indicators in this issue of *Waterlin*e is limited to terminals at Brisbane, Melbourne and Fremantle (cargo receival, stevedoring rate) or Brisbane and Sydney (stevedoring completion). It is anticipated that the cargo receival and stevedoring rate indicators in future issues will also include Sydney.

The information for the December and March quarters indicates that the proportion of *cargo receivals* (exports) completed by the cut-off averaged around 53 per cent at Brisbane, 91 per cent at Melbourne and 96 per cent at Fremantle. The relatively low figure for Brisbane should be interpreted with caution. One terminal operator advised that there are special arrangements for late receival of refrigerated containers at Brisbane, and that these arrangements contribute to the efficient operation of the terminal which has a limited number of powered outlets.

Stevedoring completion provides one measure of the accuracy with which completion times (the basis for pilot and tug booking times) are forecast. The December and March quarter data indicate that the proportion of ships completed within one hour (plus or minus) of the time initially agreed was around 76 per cent at Brisbane and 26 per cent at Sydney. The extent of variation between the two ports was similar for the two terminal operators. An indicator of stevedoring completion based on confirmed time, which was included in the proposed indicators presented in *Waterline* 9, has been deleted from the series as the data are not collected by either terminal operator.

The *stevedoring rate* (as defined in table 2) provides a measure of the variability in performance over the quarter. The data for the December and March quarters indicate that the proportion of ship calls where the crane rate was within 2 containers per hour (plus or minus) of the quarterly average was around 43 per cent at Brisbane, 67 per cent at Melbourne and 29 per cent at Fremantle.

Crane rates at a terminal will always vary for individual ship calls due to differences in average exchanges, cellular configurations, the age and condition of the ship's fittings, the nature of the operation (eg discharge only, load only or load/discharge) and other factors. The inter-port variation in the stevedoring rate indicator reflects, at least in part, major differences in the mix of operations. For example, operations at Melbourne typically involve large exchanges concentrated in particular areas of the ship, whereas at Fremantle there is greater variation due to factors such as restows and handling aboard ship.

Other waiting time

For the purposes of the *Waterline* indicators, reliability is defined in terms of the *variability and predictability* of performance. The indicators of berth availability, pilotage and towage discussed earlier therefore focus on delays incurred as a result of the unavailability of a facility or service at the time booked for the ship.

The reliability indicators do not measure the *responsiveness or flexibility* of port service providers when there are changes in ship movement times. For example, if a ship arrives ahead of the scheduled time or is completed early by the stevedore, it will incur waiting time if the booked times for port services such as towage cannot be changed. These waiting times potentially impose additional costs on shipping lines if the time could otherwise be used productively.

Several of the lines which responded to the BTCE's request for data on berth availability, pilotage and towage identified waiting times caused by factors other than reliability issues. Some of the major factors in the March quarter were:

- early completion of stevedoring work – 10 ship calls (waiting time ranged between 1.6 hours and 8.4 hours);
- early ship arrival – 9 ship calls (waiting time ranged between 2.5 hours and 28.0 hours);
- awaiting arrival of stevedoring labour – 8 ship calls (waiting time ranged between 0.9 hours and 19.1 hours); and
- awaiting towage services due to other river moves (Melbourne) or tidal tankers (Sydney) – 3 ship calls (waiting time ranged between 1 hour and 3 hours).

Other sources of waiting time identified by the lines included ship repairs, adjustment of sailing schedules, late arrival of the ship, crane breakdowns, late changes to cargo layout, tides, weather, port holidays and industrial disputes.

A range of factors contribute to waiting time. They include aspects of ship operation, the trade-off between charges and service quality in a small market such as Australia, and the work practices of port service providers.

Concluding comments

During the March quarter, a berth was available within four hours of the booked time for 92 per cent of ship calls. Availability of pilotage and towage services within one hour of the booked time was 100 per cent.

Initial data for several ports indicate that there is significant inter-port variation for the three stevedoring indicators – cargo receival, stevedoring completion and stevedoring rate. The availability of time-series data in subsequent quarters will facilitate the analysis of stevedoring reliability, although differences in operational conditions appear to contribute to some of the inter-port variation.

CREW TO BERTH RATIOS

As part of the shipping industry reform process, the BTCE has been monitoring crew to berth ratios for Australian merchant shipping (since the September quarter 1993) and offshore shipping (since the March quarter 1995). The results of the monitoring process were initially reported to participants in the reform process, and have been included in *Waterline* since the December 1996 issue.

The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship/s operated. Berth days operated is defined as the sum, over the period, of the number of people normally required each day by the relevant statutory authority and the ship operator to be employed in order to carry out the work of the ship/s in a safe and efficient manner.

This article updates the information on crew to berth ratios for Australian merchant and offshore shipping with data for the March quarter 1997.

Merchant shipping

Figure 7 presents information on the crew to berth ratio, and its components, for Australian merchant shipping over the period from the September quarter 1993 to the March quarter 1997.

The overall crew to berth ratio for merchant shipping was 2.174 in the March quarter. This was down from the December quarter 1996 ratio of 2.247 which was the highest ratio since the beginning of the monitoring process (initial level 2.133). The decrease in the March quarter partly reflected the ending of the additional crew requirements for several ships which were transferred between operators in the December quarter. It appears that some other factors also contributed to the decrease, as the crew to berth ratio in the March quarter (2.174) was below the ratio in the September quarter 1996 (2.195).

Individual components of the crew to berth ratio for merchant shipping generally declined in the March quarter, the only exception being compensation leave. Most of the reduction in the overall ratio was attributable to falls in the ship time, accrued leave and study leave ratios.

Ship time is the largest component of the crew to berth ratio for merchant shipping. The ship time ratio was 1.060 in the March quarter, down from 1.093 in the December quarter (initial level 1.025).

Accrued leave (initially called recreation leave in *Waterline*) gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35-hour week. The accrued leave ratio decreased to 0.980 in the March quarter from 1.003 in the December quarter (initial level 0.971).

Compensation leave is the third largest component of the crew to berth ratio for merchant shipping. The compensation leave ratio was 0.078 in the March quarter compared with 0.077 in the December quarter (initial level 0.073).

The *long service leave* ratio for merchant shipping was 0.036 in the March quarter compared with 0.037 in the December quarter (initial level 0.035).

The remaining components accounted for 1 per cent of the overall crew to berth ratio for merchant shipping in the March quarter. The *study leave* ratio decreased to 0.016 in the March quarter from 0.027 in the December quarter (initial level 0.024). The *training and other paid leave* ratio declined to 0.005 from 0.010 over this period (initial level 0.006).

Table 4 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, in the March quarter. Engineers had the highest ratio (2.232) followed by deck officers (2.210), integrated ratings (2.141) and catering crew (2.122).

Offshore shipping

Figure 8 presents data on the crew to berth ratio, and its components, for Australian offshore shipping over the period from the March quarter 1995 to the March quarter 1997.

The overall crew to berth ratio for offshore shipping was 2.373 in the March quarter, up from 2.343 in the December quarter 1996. The March quarter ratio was the highest figure for offshore shipping since the beginning of the monitoring process (initial level 2.327).

Four components of the crew to berth ratio for offshore shipping increased in the March quarter and the remaining two components were unchanged. Most of the increase in the overall ratio was attributable to rises in the study leave and ship time ratios.

Accrued leave (initially called recreation leave in *Waterline*) is the largest component of the crew to berth ratio for offshore shipping. It comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two-crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio was unchanged at 1.153 in the March quarter (initial level 1.151).

Ship time reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio was 1.037 in the March quarter, up from the December quarter figure of 1.026 (initial level 1.021).

Compensation leave is the third largest component of the crew to berth ratio for offshore shipping. The compensation leave ratio increased to 0.119 in the March quarter from 0.116 in the December quarter (initial level 0.100).

The *long service leave* ratio for offshore shipping was 0.039 in the March quarter compared with 0.038 in the December quarter (initial level 0.038).

The remaining components accounted for around 1 per cent of the overall crew to berth ratio for offshore shipping in the March quarter. The *study leave* ratio increased to 0.025 in the March quarter from 0.010 in the December quarter (initial level 0.013). The *training and other paid leave* ratio was 0.000 in both periods (initial level 0.003).

Table 5 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, in the March quarter. Catering crew had the highest ratio (2.416) followed by integrated ratings (2.402), deck officers (2.396) and engineers (2.286).

Concluding comments

The crew to berth ratio for merchant shipping declined to 2.174 in the March quarter. However, the ratio was still above the level recorded at the beginning of the monitoring process in the September quarter 1993 (initial level 2.133).

The crew to berth ratio for offshore shipping increased to 2.373 in the March quarter. This was the highest figure for offshore shipping since the beginning of the monitoring process in the March quarter 1995 (initial level 2.327).

WATERLINE
June 1997, Issue no. 11

TABLES

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS - CONTAINERS PER HOUR

	Quarter					
Port/indicator	**Dec 1995**	**Mar 1996**	**Jun 1996**	**Sep 1996**	**Dec 1996**	**Mar 1997**
Brisbane						
Crane rate	15.8	17.6	16.7	16.5	16.9	17.3
Elapsed rate	17.0	19.0	17.2	17.2	17.4	17.3[b]
Net rate	20.6	21.5	20.4	20.4	20.4	19.4[b]
Sydney						
Crane rate	15.0	15.6	16.0	16.1	15.4	14.9
Elapsed rate	17.6	18.9	17.6	18.2	a	a
Net rate	21.0	22.1	22.4	23.3	22.7	20.0[b]
Melbourne						
Crane rate	16.3	17.0	18.4	19.6	17.8	19.0
Elapsed rate	18.8	20.2	20.5	21.1	17.9	19.5[b]
Net rate	21.9	23.4	25.9	25.6	21.7	23.0[b]
Adelaide						
Crane rate	18.8	18.9	18.2	19.3	19.6	19.6
Elapsed rate	22.8	23.3	22.0	22.2	22.6	24.0
Net rate	23.3	23.8	22.5	22.8	23.1	24.6
Fremantle						
Crane rate	16.2	17.9	20.0	17.8	18.2	19.4
Elapsed rate	13.4	15.7	14.8	13.4	15.6	16.2[b]
Net rate	16.7	18.9	20.0	19.4	20.5	20.6[b]
Five ports						
Crane rate	15.9	16.9	17.7	18.0	17.1	17.4
Elapsed rate	17.7	19.3	18.6	19.0	a	a
Net rate	20.9	22.3	23.4	23.5	21.8	21.3[b]

a. Data not available at time of publication.

b. March quarter 1997 elapsed rates and net rates for all ports except Adelaide are not directly comparable with earlier figures due to changes in a terminal operator's information systems.

Sources Patrick, P&O Ports and SeaLand.

BTCE

TABLE 2 INDICATORS OF WATERFRONT RELIABILITY

Aspect	Indicator
1. Ship arrival at port	Proportion of ship arrivals within ±1 hour of the scheduled ship arrival time advised 24 hours before to the port authority. Proportion of ship arrivals within ±15 minutes of the confirmed ship arrival time advised 6 hours before to port service providers.
2. Berth availability	Proportion of ship arrivals where the berth is available within 4 hours of the scheduled berthing time advised 24 hours before to the port authority.
3. Pilotage	Proportion of ship movements where the pilot is available to board the ship at the agreed location within ±1 hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
4. Towage	Proportion of ship movements where tugs are available to assist the ship at the agreed location within ±1 hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
5. Cargo receival	Proportion of receivals (exports) completed by the cut-off[a].
6. Stevedoring completion	Proportion of ship visits where stevedoring completion time is within ±1 hour of the time initially agreed between the terminal operator and the client when the overall work program for the ship is prepared.
7. Stevedoring rate	Proportion of ship visits where the average crane rate for the ship is within ± 2 containers per hour of the average crane rate for the terminal over the period.

a. Cargo receival cut-off is usually the end of the evening shift prior to the ship's arrival. One terminal operator uses the end of the morning shift of the day of arrival for afternoon ship arrivals.

BTCE

TABLE 3 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT BOOKED TIME, MARCH QUARTER 1997

(Number of ship calls)

	Delay (hrs)								Total no. of ship calls
Port/operation	**0**	**1**	**2**	**3**	**4**	**5-10**	**11-20**	**>20**	
Brisbane									
Berth availability	14	0	0	1	0	0	0	0	15
Pilotage	15	0	0	0	0	0	0	0	15
Towage	15	0	0	0	0	0	0	0	15
Sydney									
Berth availability	39	0	1	2	0	5	2	1	50
Pilotage	50	0	0	0	0	0	0	0	50
Towage	50	0	0	0	0	0	0	0	50
Melbourne									
Berth availability	59	0	0	0	0	0	3	1	63
Pilotage	63	0	0	0	0	0	0	0	63
Towage	63	0	0	0	0	0	0	0	63
Adelaide									
Berth availability	24	0	0	1	0	1	0	0	26
Pilotage	26	0	0	0	0	0	0	0	26
Towage	26	0	0	0	0	0	0	0	26
Fremantle									
Berth availability	50	0	0	0	0	3	1	0	54
Pilotage	54	0	0	0	0	0	0	0	54
Towage	54	0	0	0	0	0	0	0	54
Five ports									
Berth availability	186	0	1	4	0	9	6	2	208
Pilotage	208	0	0	0	0	0	0	0	208
Towage	208	0	0	0	0	0	0	0	208

Source *Data provided by shipping lines.*

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TABLE 4 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, MARCH QUARTER 1997

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.093	0.997	0.024	0.036	0.040	0.019	2.210
Engineers	1.107	1.013	0.041	0.036	0.031	0.003	2.232
All officers	1.100	1.005	0.033	0.036	0.035	0.011	2.221
Integrated ratings	1.031	0.963	0.111	0.035	0.000	0.001	2.141
Catering crew	1.015	0.947	0.125	0.035	0.000	0.001	2.122
All ratings	1.026	0.958	0.115	0.035	0.000	0.001	2.135
All crew	1.060	0.980	0.078	0.036	0.016	0.005	2.174

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

Source Data provided by ship operators.

BTCE

TABLE 5 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, MARCH QUARTER 1997

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.055	1.153	0.089	0.039	0.060	0.000	2.396
Engineers	1.027	1.153	0.030	0.037	0.038	0.000	2.286
All officers	1.041	1.153	0.060	0.038	0.049	0.000	2.343
Integrated ratings	1.023	1.153	0.186	0.039	0.000	0.000	2.402
Catering crew	1.082	1.153	0.141	0.039	0.000	0.000	2.416
All ratings	1.033	1.153	0.179	0.039	0.000	0.000	2.404
All crew	1.037	1.153	0.119	0.039	0.025	0.000	2.373

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

Source Data provided by ship operators.

BTCE

TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS - TEUS PER HOUR

	Mar-92	Jun-92	Sep-92	.....	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97
Brisbane																			
Ships handled	85	96	93	na	106	111	112	140	140	187	136	123	135	132	124	133	140	141	156
Total teus	28235	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	39037	51008	66115	62904	47471
Crane rate	17.0	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.6	20.6	20.0
Elapsed rate	19.6	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.5	20.5	20.9	21.1	20.3[b]
Net rate	21.1	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.9	22.7[b]
Sydney																			
Ships handled	105	109	112	na	205	238	177	240	223	221	218	202	192	203	206	216	228	249	251
Total teus	71702	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	146038	148290	156344	174982	158323
Crane rate	18.6	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.5	19.9	20.3	19.6	18.7
Elapsed rate	19.9	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.8	22.1	23.1	*a*	*a*
Net rate	26.3	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	28.0	27.9	29.5	28.9	25.1[b]
Melbourne																			
Ships handled	108	121	121	na	235	306	211	265	267	244	265	228	221	227	228	262	274	282	230
Total teus	73441	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	162911	170884	203371	202376	162156
Crane rate	16.7	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3	24.5	22.4	23.6
Elapsed rate	19.2	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0	26.5	22.1	24.3[b]
Net rate	22.1	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.7	32.2	27.2	28.7[b]
Adelaide																			
Ships handled	22	20	21	na	21	26	28	34	31	33	35	50	34	42	47	63	70	74	69
Total teus	10810	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	23351	21963
Crane rate	19.8	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	24.0	24.6
Elapsed rate	27.2	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	27.7	30.2
Net rate	28.2	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	28.3	30.9
Fremantle																			
Ships handled	71	75	72	na	116	115	127	135	121	124	128	136	139	124	143	153	159	161	159
Total teus	25403	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	47597	51113	50791	55593	51784
Crane rate	21.0	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4	20.8	21.5	23.3
Elapsed rate	16.8	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.3	17.6	16.0	18.6	19.7[b]
Net rate	21.0	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5	22.6	24.2	25.0[b]
Five Ports																			
Ships handled	391	421	419	na	683	796	745	814	782	809	782	739	721	728	748	827	871	907	865
Total teus	209591	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	411538	440098	497140	519206	441697
Crane rate	18.0	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.3	22.3	21.2	21.5
Elapsed rate	19.4	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6	23.6	*a*	*a*
Net rate	23.3	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	27.1	28.5	29.1	27.2	26.4[b]

na not available

a Data not available at time of publication.

b Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

Notes 1. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and excluded from the measure of time in later quarters. This means that rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993.

2. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.

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INDEX OF WATERLINE ARTICLES - ISSUES 1 TO 11

Subject	Issue	Date	Pages	Coverage of article[a]
Burnie	10	March 1997	9-11	Services, facilities & port interface costs for container traffic
Coal ports in Australia	6	March 1996	10-13	Ports, terminals, capacity and operational changes, performance
Crew to berth ratios	9	December 1996	7-11	September quarter 1996
	10	March 1997	14-18	December quarter 1996
	11	June 1997	9-12	March quarter 1997
Distribution of benefits of waterfront reform	3	May 1995	11-14	Stevedoring, ship operators, importers, exporters
International comparisons of waterfront performance	4	October 1995	11-13	Overview of recent work
	5	December 1995	9-11	New Zealand ports
	6	March 1996	13-16	Asian ports
	7	June 1996	12-14	European ports
	8	September 1996	14	New Zealand (timber & steel coil)
Liner shipping	5	December 1995	11-13	Conference/non-conference shares in Australian trades to 1994/95
Non-containerised general cargo	8	September 1996	11-14	Cargoes, ships, ports, stevedoring, performance data
Port charges comparisons – methodology	4	October 1995	9-11	Teu exchanges and comparisons of port costs
Port charging – structures and terminologies	9	December 1996	11-13	Australia's six largest container ports
Port Interface Cost Index	1	July 1994	2-5	July-December 1993
	2	December 1994	2-5	January-June 1994
	3	May 1995	2-5	July-December 1994
	5	December 1995	2-5	January-June 1995
	7	June 1996	6-9	July-December 1995
	8	September 1996	6-9	January-June 1996
	10	March 1997	6-9	July-December 1996
Port performance – financial	1	July 1994	4-6	1992/93
	3	May 1995	5-6	1993/94
	6	March 1996	7-9	1994/95
	10	March 1997	12-13	1995/96

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Subject	Issue	Date	Pages	Coverage of article[a]
Port performance – non-financial	1	July 1994	4-6	July-December 1993
	2	December 1994	5, 9	January-June 1994
	3	May 1995	6-7	July-December 1994
	6	March 1996	8-9	January-June 1995
	7	June 1996	10-11	July-December 1995
	8	September 1996	10-11	January-June 1996
	10	March 1997	13-14	July-December 1996
Reliability	6	March 1996	6-7	Stevedoring industrial disputes
	7	June 1996	11-12	Concepts and available data
	9	December 1996	6-7	Proposed indicators
	10	March 1997	6	Progress on data collection
	11	June 1997	6-8	March quarter 1997
Stevedoring performance[b]	1	July 1994	5-11	December quarter 1993
	2	December 1994	6-11	March & June quarters 1994
	3	May 1995	7-11, 15	September & December qtrs 1994
	4	October 1995	2-9, 15	March & June quarters 1995
	5	December 1995	5-9, 15	September quarter 1995
	6	March 1996	2-7, 19	December quarter 1995
	7	June 1996	2-6, 15	March quarter 1996
	8	September 1996	2-5, 15	June quarter 1996
	9	December 1996	2-5, 15	September quarter 1996
	10	March 1997	2-5, 19	December quarter 1996
	11	June 1997	2-5, 15	March quarter 1997

a. Period is latest quarter or half-year covered. Articles may also include earlier data.

b. For earliest available data on stevedoring performance (from December quarter 1989), see issue 1 (table 7) or issue 2 (table 6).

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FIGURES

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE – TEUS PER HOUR

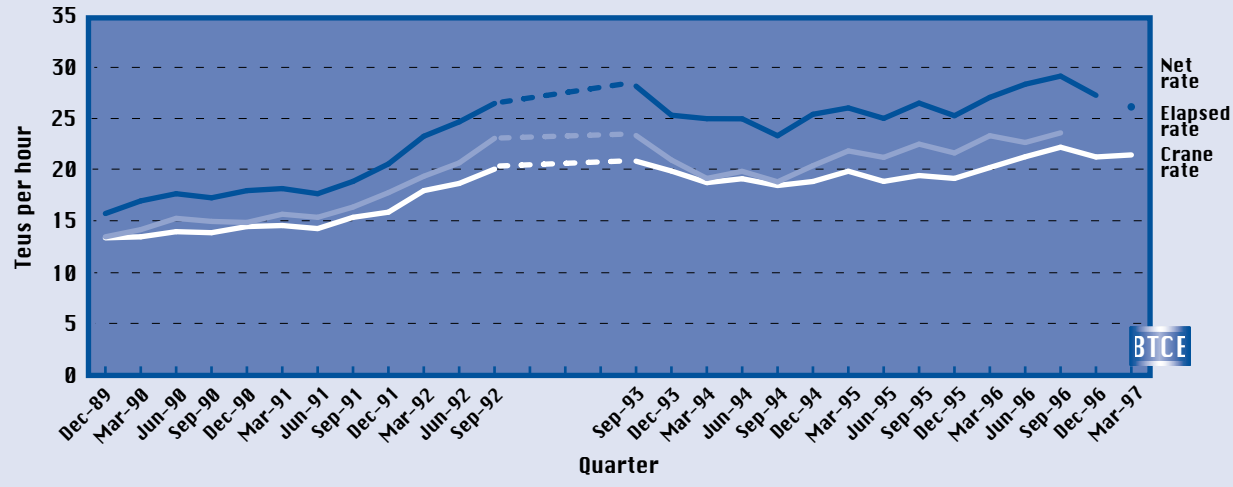
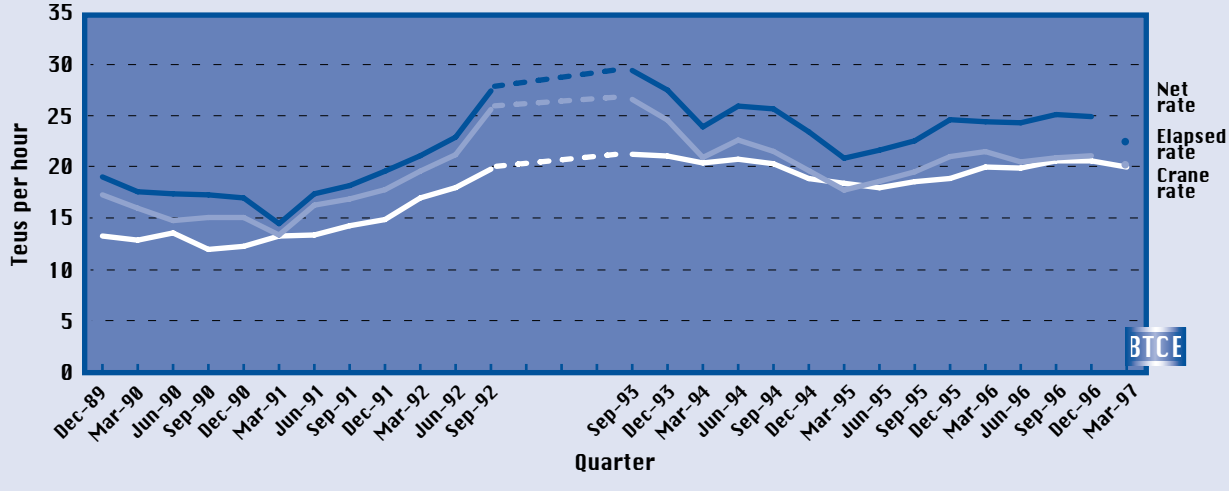


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR



Notes *Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and are excluded from the measure of time in later quarters. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR

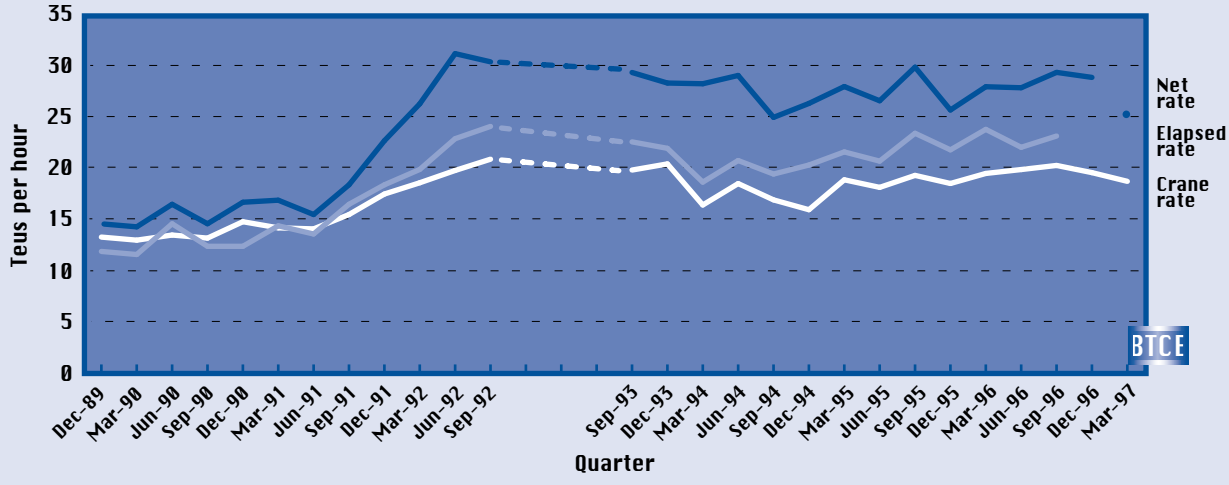
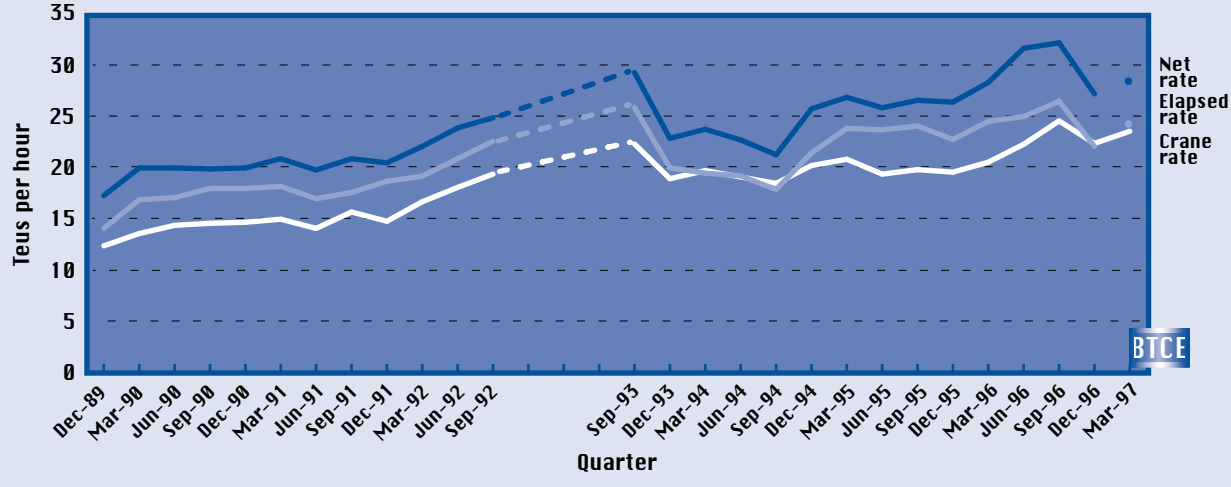


FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR



Notes *Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and are excluded from the measure of time in later quarters. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE – TEUS PER HOUR

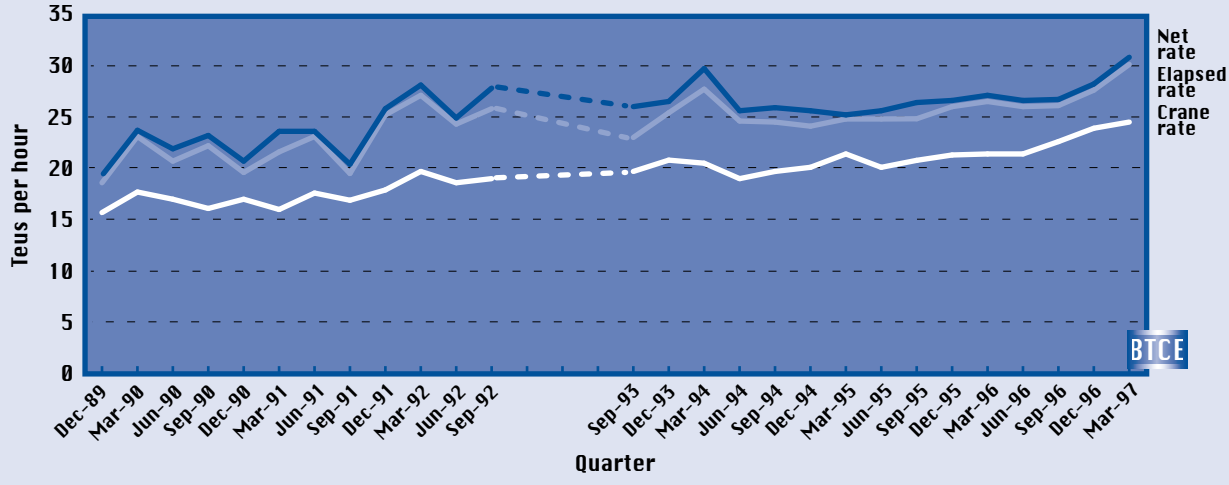
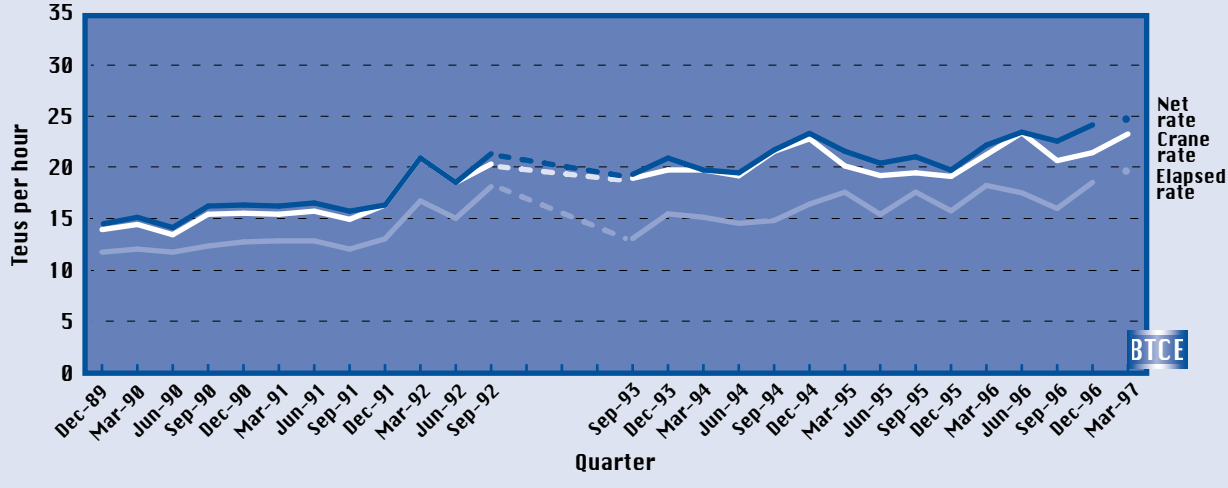


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE – TEUS PER HOUR



Notes *Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and are excluded from the measure of time in later quarters. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 7 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

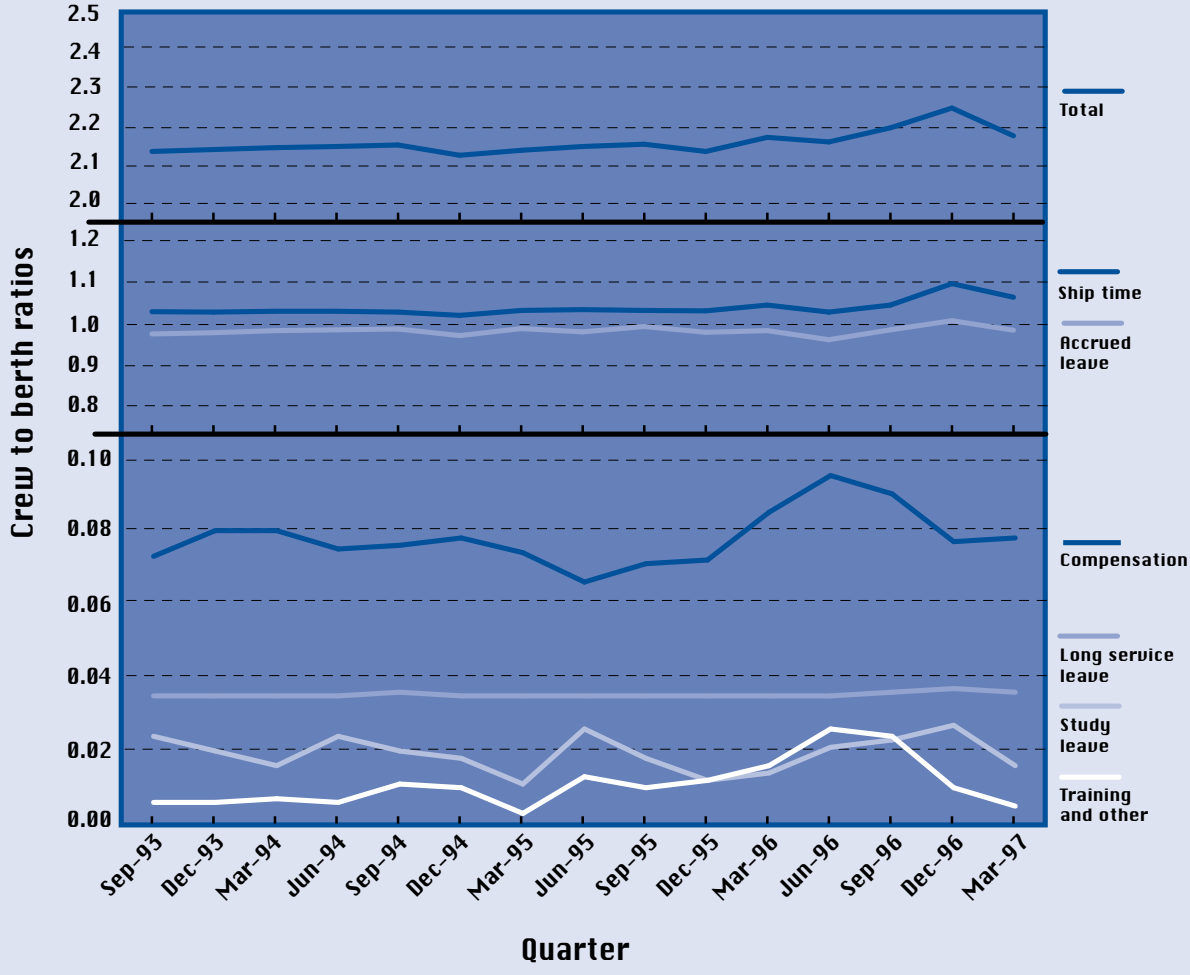
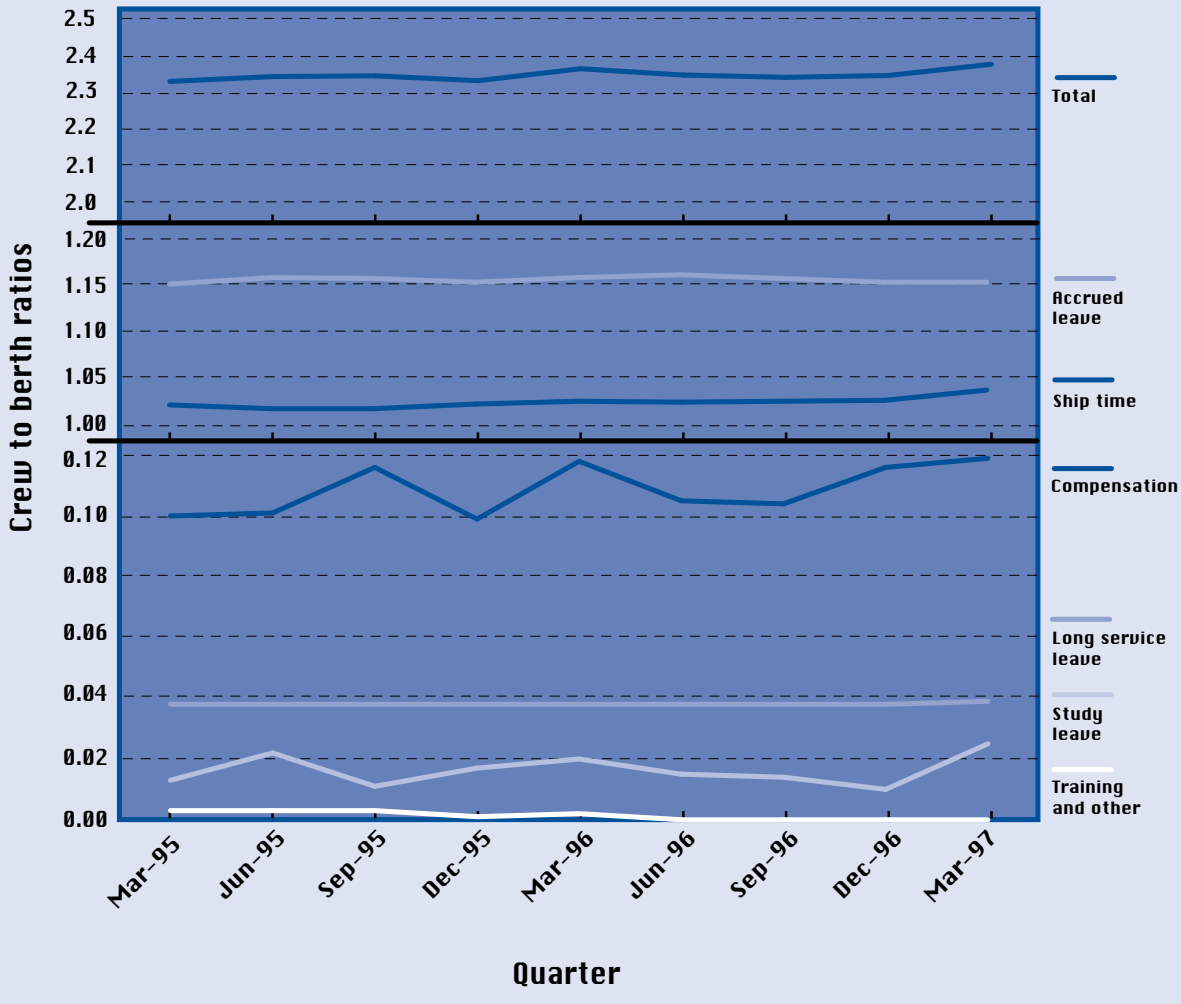


FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING



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BTCE MARITIME RESEARCH

The Bureau of Transport and Communications Economics (BTCE) undertakes applied economic research on current and emerging issues of interest to the Commonwealth Transport and Regional Development portfolio and the Department of Communications and the Arts. The research covers maritime, aviation, transport externalities, land transport and communications issues.

The BTCE's research contributes to the improved understanding of factors influencing the efficiency and growth of the transport, regional development and communications sectors and the development of effective policies in these areas. The Bureau also aims to stimulate public debate on important issues by publishing the results of its research and providing information to the public on the structure and economic performance of the transport and communications sectors.

The major projects under way in the maritime area are:

- Our newsletter *Waterline* which monitors trends in Australian stevedoring productivity, waterfront reliability, port interface costs, other aspects of port performance and crew to berth ratios;
- A joint project with the Indonesian Government to investigate transport synergies between eastern Indonesia and northern Australia;
- A maritime data base which covers international sea and air freight (by value, weight, commodity) and ship visits to Australia (ship type and origin-destination).

Another BTCE project, *Transport and Communications Indicators*, includes information on liner cargoes (imports and exports) and bulk exports. The Bureau also provides research support for committees of inquiry such as the Review of the Tasmanian Freight Equalisation Scheme.

Information on the BTCE's maritime research can be obtained from the Research Manager, Sue Elderton, (06) 274 6800. Information on individual projects is also available from the project leaders. For *Waterline*, contact Kym Starr, (06) 274 6857. For the Indonesian project, contact Neil Gentle, (06) 274 6735. The maritime data base is managed by Stephen Wheatstone, (06) 274 6751.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
BTCE	Bureau of Transport and Communications Economics
teu	Twenty-foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time – the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate – the number of containers or teus moved per elapsed hour.

Net time – the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate – the number of containers or teus moved per net hour.

Crane rate – the number of containers or teus moved per net crane hour.

ACKNOWLEDGMENTS

Contributors to this issue of *Waterline* were Kym Starr, Gita Curnow, Tim Risbey and Stephen Wheatstone. The BTCE is particularly grateful for the assistance of the Maritime Division of the Department of Transport and Regional Development, the Association of Australian Ports and Marine Authorities, individual port authorities, ship operators, shipping lines, and the stevedoring companies Patrick, P&O Ports and SeaLand.

For further information on this publication, please contact Mr Kym Starr on Tel (06) 274 6857, Fax (06) 274 6816, email: kstarr@email.dot.gov.au

This publication is available free of charge from the Manager, Information Services, Bureau of Transport and Communications Economics, GPO Box 501, Canberra, ACT, 2601, Australia. Tel (06) 274 6846.

Internet:
http:/www.dot.gov.au/programs/btce/btcehome.htm

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AUSTRALIA

WATERLINE

SEPTEMBER 1997 ISSUE NO. 12

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This issue of *Waterline* contains our quarterly articles on stevedoring productivity, waterfront reliability and crew to berth ratios. There are also articles on the Port Interface Cost Index and port performance (non-financial), which are published six-monthly.

The BTCE is continuing to examine options for refining and improving the performance indicators used in *Waterline*. A current priority is to increase the number of shipping lines involved in the survey of waterfront reliability. Forthcoming issues of *Waterline* will include feature articles on various waterfront-related activities such as those of customs brokers.

Stephen Hunter
Director

IN BRIEF

Stevedoring productivity

Overall productivity at Australia's major container terminals improved in the June quarter. Provisional data indicate that the five-port average crane rate increased to 18.3 containers per hour, from 17.4 containers per hour in the previous quarter. There were also rises in the five-port average net rate (23.6 containers per hour) and elapsed rate (19.0 containers per hour).

Crane rates increased at Sydney (17.7 containers per hour provisional) and Adelaide (21.0 containers per hour) in the June quarter. There were declines at Brisbane (16.4 containers per hour) and Fremantle (19.0 containers per hour). Melbourne's crane rate was unchanged (19.0 containers per hour).

Waterfront reliability

A berth was available within four hours of the scheduled time for 90 per cent of ship calls in the June quarter. Availability of pilots and tugs within one hour of the confirmed time remained close to 100 per cent. Various ship calls were also affected by other sources of waiting time. Initial data indicate that the consistency of stevedoring performance varied significantly between ports in the June quarter.

Port Interface Cost Index

Between July–December 1996 and January–June 1997, the national Port Interface Cost Index declined by 2.0 per cent for an import teu and by 2.2 per cent for an export teu. The reductions in the national index mainly reflected a fall in the average stevedoring charge.

Port performance - non-financial

Total cargo throughput (bulk and general cargo) at the five mainland capital city ports increased by 6.6 per cent between July–December 1996 and January–June 1997. Container traffic (teus) declined by 3.5 per cent over this period. Median ship turnaround time fell at most of the mainland capital city ports.

Crew to berth ratios

The crew to berth ratio for merchant shipping declined to 2.130 in the June quarter. This was similar to the figure of 2.133 at the beginning of the monitoring process in 1993.

The crew to berth ratio for offshore shipping increased to 2.379 in the June quarter. This was the highest figure for offshore shipping since the beginning of the monitoring process in 1995 (initial level 2.327).

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STEVEDORING PRODUCTIVITY

Table 1 presents information on stevedoring productivity at Australia's major container terminals over the period to the end of the June quarter 1997. The indicators are expressed in containers per hour which provides the most rigorous basis for productivity comparisons.

The data for Brisbane, Sydney, Melbourne and Fremantle are averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the SeaLand terminal.

Five-port average

Table 1 indicates that overall productivity at Australia's major container terminals increased in the June quarter 1997. The crane rate and net rate data are provisional and may be subject to change following further review of one Sydney terminal operator's March and June quarter figures.

The five-port average *crane rate* (productivity per crane while the ship is worked) was 18.3 containers per hour in the June quarter, up from 17.4 containers per hour in the March quarter.

The five-port average *net rate* (total productivity while the ship is worked) increased to 23.6 containers per hour in the June quarter from 21.3 containers per hour in the March quarter.

The five-port average *elapsed rate* (total productivity based on the time labour is aboard the ship) was 19.0 containers per hour in the June quarter, up from 18.6 containers per hour in the March quarter.

Brisbane

Stevedoring productivity at Brisbane declined in the June quarter.

The crane rate was 16.4 containers per hour, down from 17.3 containers per hour in the previous quarter.

Brisbane's net rate declined to 18.7 containers per hour in the June quarter from 19.4 containers per hour in the March quarter. The elapsed rate was 16.6 containers per hour, down from 17.3 containers per hour in the previous quarter.

The proportion of elapsed time not worked averaged 11.5 per cent at Brisbane over the June quarter, compared with 10.8 per cent in the March quarter.

Sydney

The available data indicate that Sydney's stevedoring productivity improved in the June quarter. The crane rate and net rate data are provisional and may be subject to change following further review of one terminal operator's March and June quarter figures.

The crane rate at Sydney was 17.7 containers per hour in the June quarter, up from 14.9 containers per hour in the previous quarter.

Sydney's net rate increased to 25.5 containers per hour in the June quarter from 20.0 containers per hour in the March quarter. The elapsed rate was 18.5 containers per hour, up from 18.2 containers per hour in the previous quarter.

Changes to one Sydney terminal operator's reporting processes contributed to part of the June quarter increase in the crane rate and the net rate.

Melbourne

Melbourne's crane rate was unchanged at 19.0 containers per hour in the June quarter. There were improvements in the net rate and the elapsed rate.

The net rate increased to 24.0 containers per hour in the June quarter from 23.0 containers per hour in the March quarter. The increase reflected a rise in average crane intensity over the period.

Melbourne's elapsed rate was 20.3 containers per hour in the June quarter, up from 19.5 containers per hour in the March quarter.

The proportion of elapsed time not worked averaged 15.4 per cent at Melbourne over the June quarter. This was similar to the March quarter figure of 15.3 per cent.

Adelaide

Adelaide's stevedoring productivity improved in the June quarter.

The crane rate was 21.0 containers per hour, up from 19.6 containers per hour in the previous quarter.

The net rate rose to 29.1 containers per hour in the June quarter from 24.6 containers per hour in the March quarter. A rise in average crane intensity contributed to the increase in the net rate.

Adelaide's elapsed rate was 28.3 containers per hour in the June quarter, up from 24.0 containers per hour in the March quarter.

The average proportion of elapsed time not worked at Adelaide was 2.7 per cent in the June quarter, compared with 2.4 per cent in the March quarter.

Fremantle

Stevedoring productivity at Fremantle declined in the June quarter.

The crane rate was 19.0 containers per hour, down from 19.4 containers per hour in the previous quarter.

Fremantle's net rate declined to 19.8 containers per hour in the June quarter from 20.6 containers per hour in the March quarter. The elapsed rate was 15.9 containers per hour, down from 16.2 containers per hour in the previous quarter.

The proportion of elapsed time not worked averaged 19.5 per cent at Fremantle over the June quarter. This was below the March quarter figure of 21.5 per cent.

Teus per hour

Figures 1 to 6 and **table 10** present the stevedoring productivity indicators in terms of *teus* per hour. These data are retained in *Waterline* for the purposes of long-term historical comparison. They are not directly comparable with the data in **table 1** which are expressed in *containers* per hour.

The teu-based and container-based data generally indicate similar trends in productivity in the June quarter.

WATERFRONT RELIABILITY

Waterline 11 presented the first data for the reliability indicators developed by the BTCE in consultation with major industry participants. This article provides updated and expanded information for the March and June quarters 1997.

Ship arrival

The definitions for the two ship arrival indicators have been amended following a review of available data and discussions with the AAPMA. The indicators are based on the proportion of ships arriving within one hour (plus or minus) of the scheduled arrival time. The scheduled time is the most recent advice available to the port authority/corporation, at 24 hours prior to actual arrival for one indicator and within the last 24 hours prior to actual arrival for the other indicator.

Preliminary data for three mainland capital city ports indicate that the proportion of container ship arrivals within one hour of the scheduled time available at 24 hours prior to actual arrival ranged from around 50 per cent to 60 per cent at individual ports in the June quarter. Information for the second indicator will be published in the next issue of *Waterline.*

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for container ships at the five mainland capital city ports in the June quarter. The data cover 252 ship calls, equivalent to 28 per cent of total ship calls at the major container terminals during the period. The proportion at individual ports ranges from 17 per cent (Brisbane) to 42 per cent (Adelaide).

Berth availability indicates the proportion of ship arrivals where the berth is available within 4 hours of the

scheduled berthing time. The five-port average figure was 90 per cent in the June quarter, compared with 92 per cent in the March quarter. Shipping lines indicated that the major factors contributing to berth delays in the June quarter were congestion, late completion of work on preceding vessels and industrial action.

Pilotage measures the proportion of ship movements where the pilot is available to board the ship within one hour of the confirmed ship arrival/departure time. The five-port average figure was 99.6 per cent in the June quarter, similar to the March quarter figure of 100 per cent. Shipping lines advised that the two delays in the June quarter resulted from industrial action by pilot boat crews.

Towage indicates the proportion of ship movements where the tug is available to assist the ship within one hour of the confirmed ship arrival/departure time. The five-port average figure was 99.2 per cent in the June quarter, similar to the March quarter figure of 100 per cent. Shipping lines indicated that the three delays in the June quarter resulted from problems with the previous tug job (2) and industrial action by tug crews (1).

Stevedoring

Some preliminary information on container stevedoring, based on a combination of December and March quarter data, was published in *Waterline* 11. March quarter data have now been received from both P&O Ports and Patrick.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off. In the March quarter cargo receival averaged 91 per cent at Brisbane, 93 per cent at Sydney and 95 per cent at Melbourne. The proportion for Brisbane is substantially higher than the preliminary figure published in *Waterline* 11, due to the revision of one operator's data. Information for Fremantle will be included in *Waterline* 13.

Stevedoring completion is the proportion of ship visits where stevedoring completion time is within one hour (plus or minus) of the time initially agreed when the overall work program for the ship is prepared. In the March quarter stevedoring completion was 72 per cent at Brisbane and 27 per cent at Sydney. Data are not available for Melbourne and Fremantle as one of the terminal operators does not record the information at these ports.

Stevedoring rate is the proportion of ship visits where the average crane rate for the ship is within 2 containers per hour (plus or minus) of the quarterly average crane rate for the terminal. In the March quarter, the proportion was around 57 per cent at Brisbane, 66 per cent at Sydney, 61 per cent at Melbourne and 31 per cent at Fremantle. The inter-port variation reflects, at least in part, differences in the mix of operations (eg the extent of restows).

Other waiting time

The ten shipping lines which supplied data on berth availability, pilotage and towage for **table 2** also provided information on other sources of ship waiting time. There were 106 ship calls affected by other waiting time (excluding ship schedule adjustments) in the June quarter.

Specific information on the sources of waiting time was provided for 86 of these ship calls. Some ship calls were affected by two or three incidents. Five factors accounted for 68 per cent of the waiting time incidents in the June quarter:

- early ship arrival—18 ship calls (including 10 at Melbourne and 4 at Fremantle), with waiting time ranging from 2.5 hours to 39.6 hours;
- early completion of stevedoring—15 ship calls (including 9 at Melbourne and 4 at Adelaide), with waiting time ranging from 0.5 hours to 5.9 hours;
- industrial action—13 ship calls (including 5 at Sydney and 4 at Brisbane), with waiting time ranging from 1.1 hours to 24.0 hours;
- crane breakdown—12 ship calls (including 9 at Brisbane), with waiting time ranging from 0.4 hours to 4.0 hours; and
- awaiting labour—12 ship calls (including 7 at Melbourne and 4 at Sydney), with waiting time ranging from 1.0 hour to 23.0 hours.

Waiting time will impose additional costs on shipping lines if the time could otherwise have been used productively.

Concluding comments

A berth was available within four hours of the scheduled time for 90 per cent of ship calls in the June quarter. Availability of pilots and tugs within one hour of the confirmed time remained close to 100 per cent. Various ship calls were also affected by other sources of waiting time. Initial data indicate that the consistency of stevedoring performance varied significantly between ports over the period.

The BTCE will be undertaking more detailed analysis of reliability issues as data for additional quarters become available.

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs (charges) for containers moved through Australia's mainland capital city ports. Information for the period to January–June 1997 is presented in **tables 3 to 6.**

Cost parameters

The basic parameters used in the Port Interface Cost Index cover the representative ship, teus exchanged and other ship call information.

Table 3 indicates that there was no change in the size of the representative ship used to calculate port and related charges for January–June 1997. The number of port calls for the representative ship increased at Sydney and Fremantle, and elapsed berth time fell at these ports.

In the latest period the average number of teus exchanged per port call for ships in the representative range declined at Brisbane (8.2 per cent), Sydney (1.7 per cent) and Melbourne (0.3 per cent). There were increases at Fremantle (13.4 per cent) and Adelaide (0.5 per cent).

Charges per ship visit

Table 4 outlines the components of port and related charges at the five mainland capital city ports. The last two rows of the table present information on total ship-based charges and empty teu charges per ship visit for the representative ship.

Total ship-based charges per ship visit declined at Brisbane between July–December 1996 and January–June 1997 as a result of a 29 per cent reduction in conservancy. There was also a decline at Fremantle following a 3.6 per cent reduction in towage charges. Scheduled charges were unchanged at the other ports. However, a marginal fall in average berth time, which reduced the time-based payment for berth hire, resulted in a slight decline in total ship-based charges per ship visit at Melbourne.

Table 4 indicates that, for an operator of a vessel similar in size to the representative ship, Fremantle ($17 278) had the lowest total ship-based charges per ship visit in January–June 1997. It was followed by Brisbane ($19 157) and Adelaide ($19 873).

Since January–June 1997, there have been reductions in tonnage charges at Melbourne and Sydney and a decrease in pilotage charges at Fremantle. These changes will be incorporated in the next Port Interface Cost Index (July–December 1997) which will be reported in the March 1998 issue of Waterline.

Port and related charges per teu

Port and related charges per teu incorporate ship-based charges per teu (ie ship-based charges per ship visit divided by average teu exchange) and cargo-based charges.

Ship-based charges per teu provide an indication of the potential impact of ship-based charges on shippers. Between July–December 1996 and January–June 1997 ship-based charges per teu increased at Brisbane (5.1 per cent) and Sydney (1.6 per cent) as a result of the reductions in average teu exchanges

noted earlier. There was a fall at Fremantle (14.7 per cent) due to the higher average exchange and lower towage charges. Ship-based charges per teu fell slightly at Melbourne and Adelaide in response to the marginal rises in average teu exchanges at these ports.

Cargo-based charges for loaded containers were generally unchanged in January–June 1997 compared with July–December 1996. At Adelaide, a decrease in the proportion of containers loaded with primary produce (concessional charge) resulted in a slight increase in the weighted average charge for loaded export containers at the port.

Overall, *port and related charges per teu* (ship-based charges per teu plus cargo-based charges) for loaded export containers declined at Fremantle (7.2 per cent), Adelaide (0.3 per cent) and Melbourne (0.04 per cent). There were increases at Brisbane (2.2 per cent) and Sydney (0.7 per cent).

Since January–June 1997, there have been reductions in wharfage charges at Melbourne, Adelaide and Fremantle. These changes will be incorporated in the next Port Interface Cost Index July–December 1997) which will be reported in the March 1998 issue of *Waterline.*

Stevedoring charges per teu

The ACCC's latest survey of container terminal operations indicates that weighted average revenue for container stevedoring was $203 per teu in 1995. The BTCE is currently working to obtain more recent data on average stevedoring charges for inclusion in *Waterline*. As an interim measure, information from industry sources has been used to prepare a provisional estimate for January–June 1997.

A range of shipping lines and terminal operators have advised the BTCE that stevedoring charges per teu declined by 5–10 per cent between 1995 and mid-1997. The reductions generally occurred in late 1996 and in the first half of 1997. They reflect several factors including the continued trend to stevedoring contracts based on rates per lift (rather than separate rates for 20 foot and 40 foot containers) and declines in charges, particularly for 40 foot containers.

Using a mid-point figure of 7.5 per cent, it is estimated that average revenue for container stevedoring has fallen by around $15 per teu since 1995. The stevedoring charge for the Port Interface Cost Index is therefore $188 per teu (ie $203 - $15) in January–June 1997. This figure is provisional and will be updated when detailed data are available.

Land-based charges per teu

Information on customs brokers' fees and road transport charges in July–December 1996 and January–June 1997 is included in **table 5**. The average charges are based on data provided by around 40 customs brokers and 50 road transport operators.

Customs brokers' fees for imports were unchanged at most ports in January–June 1997. The only changes were a decrease of $3 per teu at Adelaide and an increase of $9 per teu at Fremantle. For exports, the changes were limited to marginal declines of $1 per teu at Brisbane and Fremantle.

Road transport charges rose at all ports between July–December 1996 and January–June 1997. The increases ranged from $1 per teu (Sydney and Adelaide) to $4 per teu (Fremantle).

Indexes for individual ports

Table 5 indicates that port interface costs declined at all of the mainland capital city ports between July–December 1996 and January–June 1997.

The totals for individual ports in **table 5** should be interpreted with caution as the most significant factor in the latest period was the estimated fall of $15 per teu in the stevedoring charge. The use of a single stevedoring charge for all ports in *Waterline* reflects the scope of the available information which is not disaggregated on an individual port basis. In practice, container stevedoring charges often vary between ports. In addition, there has reportedly been some variation in the trends in stevedoring charges at individual ports since 1995.

Table 5 indicates that several other factors contributed to the changes in port interface costs at individual ports between July–December 1996 and January–June 1997. Port and related charges per teu were a

major factor at Fremantle and also affected Brisbane, Sydney and Adelaide. Customs brokers' fees contributed to the movements in port interface costs at Brisbane (exports only), Adelaide (imports only) and Fremantle. Changes in road transport charges affected all ports.

National index

Data on the national Port Interface Cost Index are presented in **table 6**. In overall terms, the index declined by 2.0 per cent for an import teu and by 2.2 per cent for an export teu between July–December 1996 and January–June 1997. In real terms, the falls were 3.1 per cent for imports and 3.3 per cent for exports.

The reductions in the national index mainly reflected the lower stevedoring charge (provisional estimate). Changes in other charges were relatively small in most cases, the major exceptions being the decline in port and related charges per teu and the increase in customs brokers' fees (imports only) at Fremantle.

PORT PERFORMANCE - NON-FINANCIAL

Information on aspects of non-financial performance for the five mainland capital city ports in 1996/97 is presented in **table 7**.

Cargo throughput

Total cargo throughput (bulk and general cargo) at the five ports rose by 6.6 per cent between July–December 1996 and January–June 1997. There were increases at Brisbane (13.7 per cent), Adelaide (8.8 per cent) and Fremantle (17.2 per cent). Throughput declined at Sydney (3.4 per cent) and Melbourne (0.9 per cent).

The increase in total cargo throughput between July–December 1996 and January–June 1997 followed a decline of 0.6 per cent in the previous half-year. Total throughput in January–June 1997 was 6.0 per cent higher than throughput in the corresponding half-year of 1996, reflecting increases at all ports over the period.

The tonnage of *non-containerised general cargo* handled at the five ports declined by 3.1 per cent between July–December 1996 and January–June 1997. There were reductions at Sydney (5.3 per cent), Melbourne (10.5 per cent) and Adelaide (14.6 per cent). Tonnages increased at Brisbane (10.2 per cent) and Fremantle (15.0 per cent). The tonnage of non-containerised general cargo handled at the five ports in January–June 1997 was 4.0 per cent higher than the tonnage in the corresponding half-year of 1996.

Container traffic (teus) at the five ports declined by 3.5 per cent over the period from July–December 1996 to January–June 1997. There were reductions at Sydney (4.2 per cent), Melbourne (4.8 per cent), Adelaide (3.4 per cent) and Fremantle (0.9 per cent). Container traffic increased at Brisbane (0.8 per cent). Overall for the five ports, there were decreases in full import teus (5.1 per cent), empty import teus (7.2 per cent) and empty export teus (8.9 per cent). Full export teus increased by 0.4 per cent.

In 1996/97, a total of almost 2.3 million teus were exchanged at the five mainland capital city ports. This represented a 7.3 per cent increase over the 1995/96 figure.

Employment

Table 7 indicates that total employment at the five mainland capital city port authorities/corporations fell by 5.1 per cent between July–December 1996 and January–June 1997. Employment declined at Brisbane (9.7 per cent), Sydney (5.8 per cent), Adelaide (0.5 per cent) and Fremantle (5.9 per cent). There was a slight increase at Melbourne (2.9 per cent).

Employment at the mainland capital city port authorities/corporations has fallen by around 52 per cent since the first data (covering July–December 1993) were published in *Waterline* 1.

Ship turnaround time

The median turnaround time for ships calling at the container terminals declined at Brisbane, Sydney, Adelaide and Fremantle in January–June 1997 compared with the July–December 1996 period. There was a marginal increase at Melbourne.

The 95th percentile ship turnaround time fell at Sydney, Melbourne, Adelaide and Fremantle between July–December 1996 and January–June 1997. There was an increase at Brisbane. The 95th percentile figure indicates the turnaround time that is equalled or bettered by 95 per cent of ships using a particular port.

CREW TO BERTH RATIOS

The BTCE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The results of the monitoring process have been reported in *Waterline* since the December 1996 issue.

The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship/s operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to be employed in order to carry out the work of the ship/s in a safe and efficient manner.

This article updates the information on crew to berth ratios for Australian merchant and offshore shipping with data for the June quarter 1997.

Merchant shipping

Figure 7 presents information on the crew to berth ratio, and its components, for Australian merchant shipping over the period from the September quarter 1993 to the June quarter 1997.

During the preparation of the June quarter figures, several ship operators revised their data for the two preceding quarters to more accurately reflect the definitions used in the monitoring process. These revisions affected the overall crew to berth ratios as well as the ship time, accrued leave, compensation and long service leave components. The revised crew to berth ratios are 2.191 (previously 2.247) for the December quarter 1996 and 2.139 (previously 2.174) for the March quarter 1997. The BTCE regularly audits the data collection and processing systems of ship operators involved in the crew to berth monitoring process.

The *crew to berth ratio* for merchant shipping was 2.130 in the June quarter, down from the revised March quarter figure of 2.139. The initial level at the beginning of the monitoring process in the September quarter 1993 was 2.133. Major changes over the latest period were a reduction in the compensation ratio and an increase in the study leave ratio.

Ship time is the largest component of the crew to berth ratio for merchant shipping. The ship time ratio was 1.033 in the June quarter, compared with 1.035 (revised) in the March quarter (initial level 1.025).

Accrued leave (initially called recreation leave in *Waterline)* gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35-hour week. The accrued leave ratio was 0.969 in the June quarter, similar to the figure of 0.970 (revised) in the March quarter (initial level 0.971).

Compensation leave is the third largest component of the crew to berth ratio for merchant shipping. The compensation leave ratio declined to 0.061 in the June quarter from 0.077 (revised) in the March quarter (initial level 0.073).

The *long service leave* ratio for merchant shipping was unchanged at 0.035 in the June quarter (initial level 0.035).

The *study leave* ratio increased to 0.025 in the June quarter from 0.016 in the March quarter (initial level 0.024).

The *training and other paid leave* ratio was 0.006 in the June quarter compared with 0.005 in the March quarter (initial level 0.006).

Table 8 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, in the June quarter. Engineers had the highest ratio (2.152) followed by deck officers (2.134), catering crew (2.129) and integrated ratings (2.113).

Offshore shipping

Figure 8 presents data on the crew to berth ratio, and its components, for Australian offshore shipping over the period from the March quarter 1995 to the June quarter 1997.

The *crew to berth ratio* for offshore shipping was 2.379 in the June quarter, up from 2.373 in the March quarter. The increase mainly reflected a rise in the study leave ratio, which more than offset falls in the ship time and compensation ratios. The June quarter figure was the highest crew to berth ratio for offshore shipping since the beginning of the monitoring process (initial level of 2.327 in the March quarter 1995).

Accrued leave (initially called recreation leave in *Waterline*) is the largest component of the crew to berth ratio for offshore shipping. It comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two-crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio was unchanged at 1.153 in the June quarter (initial level 1.151).

Ship time reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio was 1.019 in the June quarter, down from 1.037 in the March quarter (initial level 1.021).

Compensation leave is the third largest component of the crew to berth ratio for offshore shipping. The compensation leave ratio decreased to 0.113 in the June quarter from 0.119 in the March quarter (initial level 0.100).

The *long service leave* ratio for offshore shipping was unchanged at 0.039 in the June quarter (initial level 0.038).

The *study leave* ratio increased to 0.055 in the June quarter from 0.025 in the March quarter. The June quarter study leave ratio was the highest figure for offshore shipping since the beginning of the monitoring process (initial level 0.013).

The *training and other paid leave* ratio was unchanged at 0.000 in the June quarter (initial level 0.003).

Table 9 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, in the June quarter. Deck officers had the highest ratio (2.442) followed by catering crew (2.404), integrated ratings (2.372) and engineers (2.318).

Concluding comments

The crew to berth ratio for merchant shipping declined to 2.130 in the June quarter. This was similar to the figure of 2.133 at the beginning of the monitoring process in the September quarter 1993.

The crew to berth ratio for offshore shipping increased to 2.379 in the June quarter, mainly reflecting a rise in the study leave ratio. This was the highest figure for offshore shipping since the beginning of the monitoring process in the March quarter 1995 (initial level 2.327).

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FIGURES

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE—TEUS PER HOUR

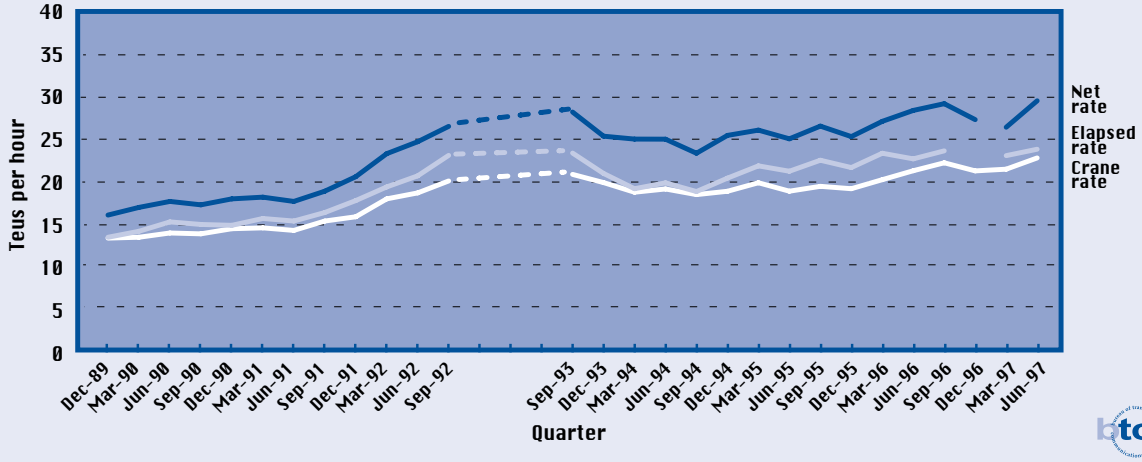
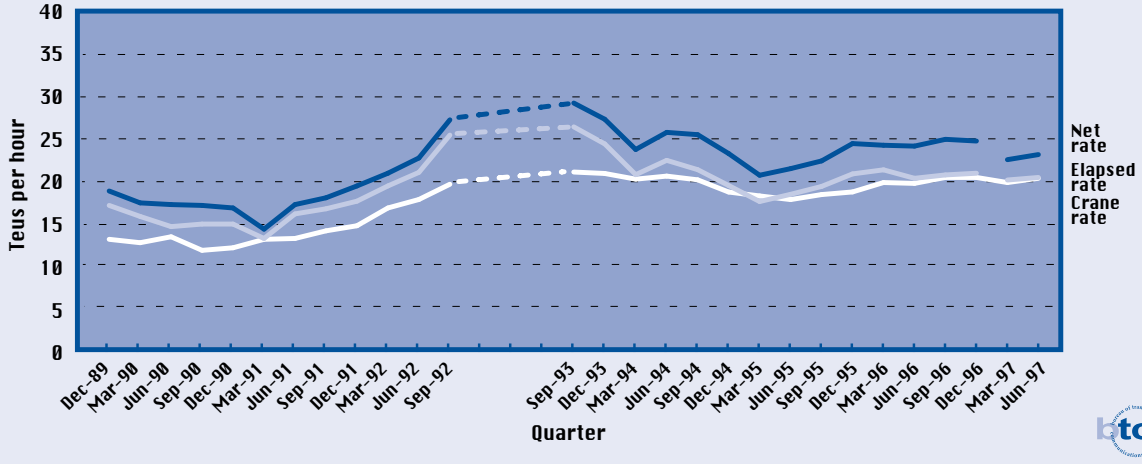


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR



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FIGURES

FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR

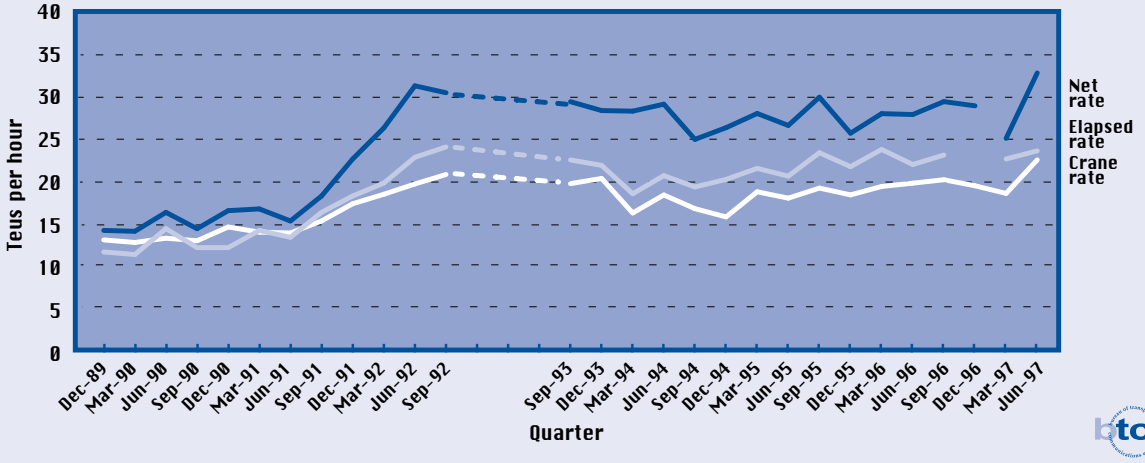
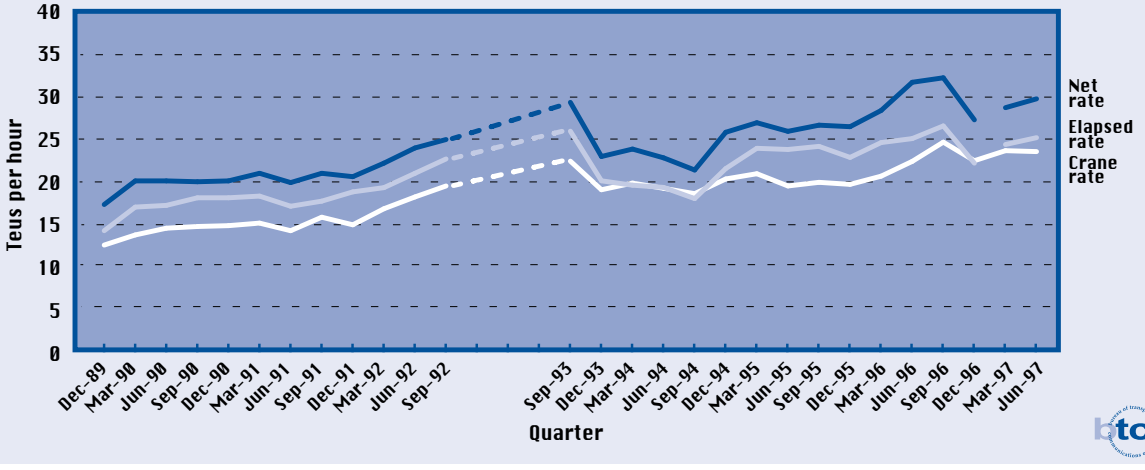


FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR



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FIGURES

FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE—TEUS PER HOUR

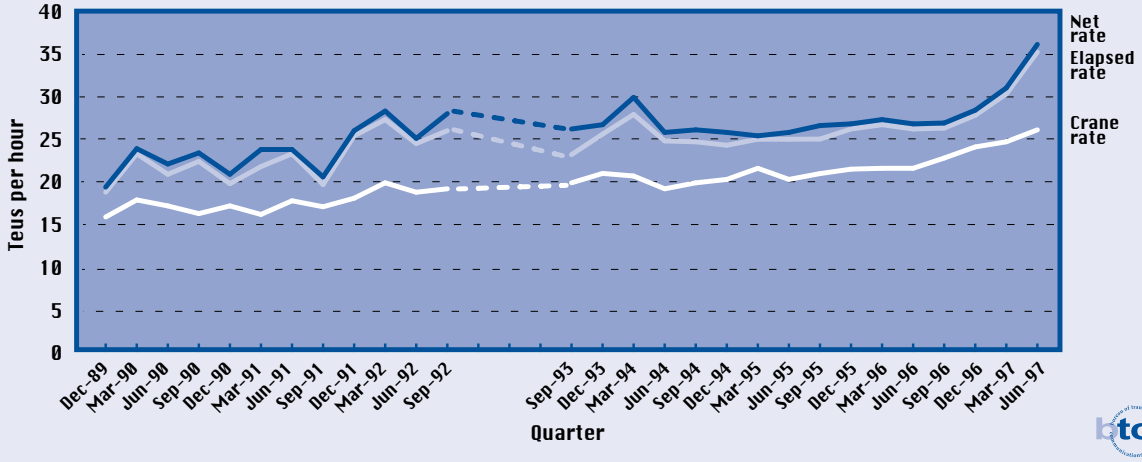
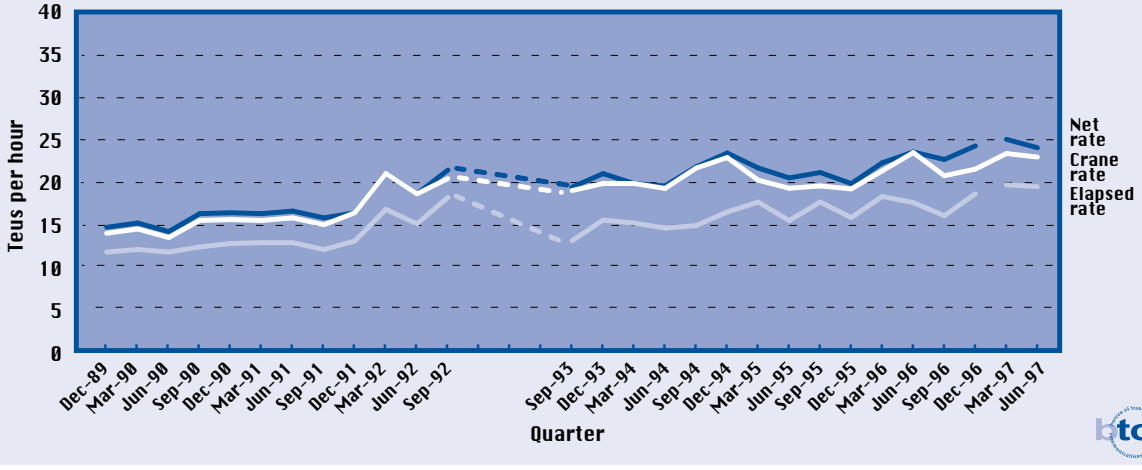


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR



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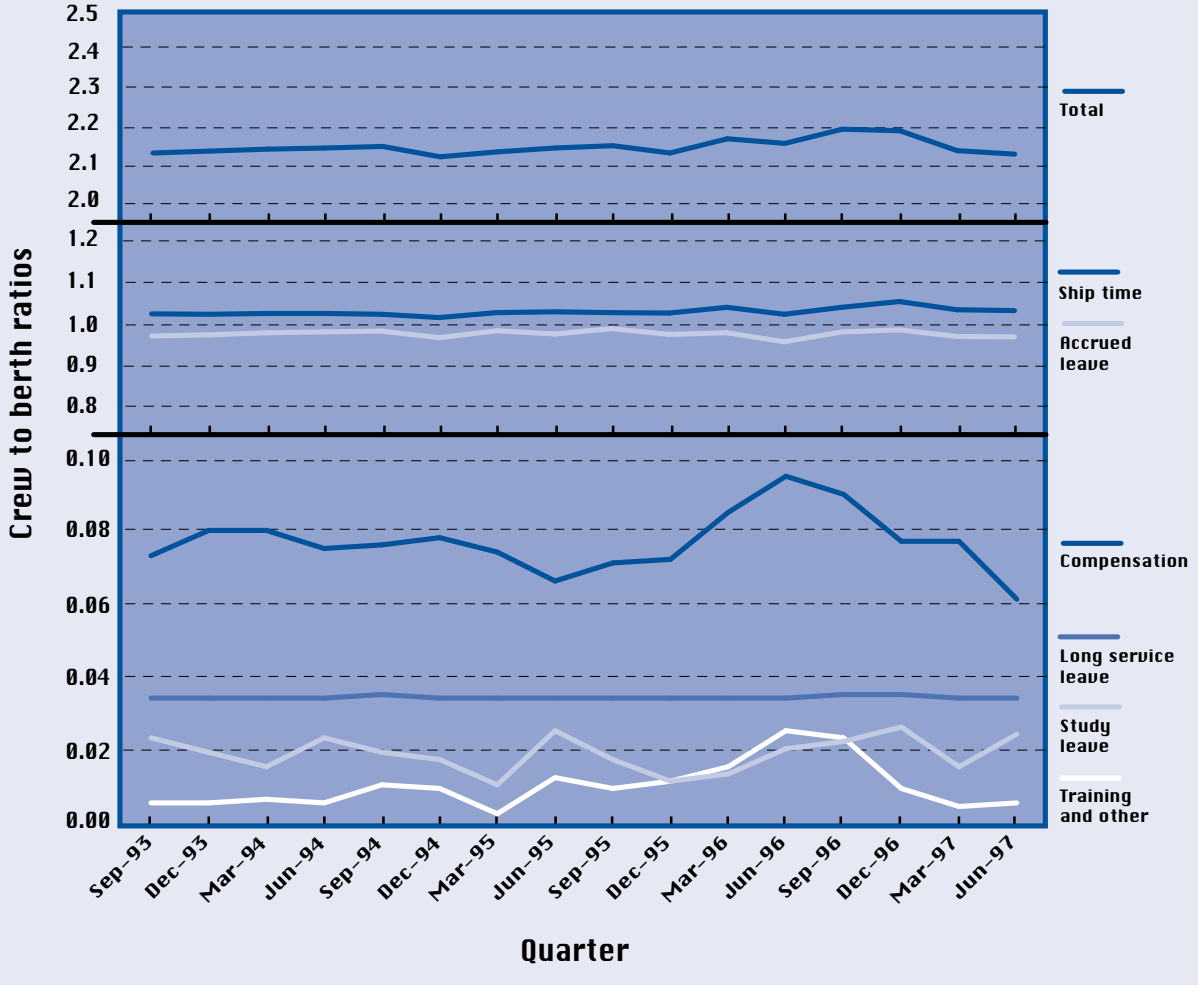
FIGURES

FIGURE 7 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING



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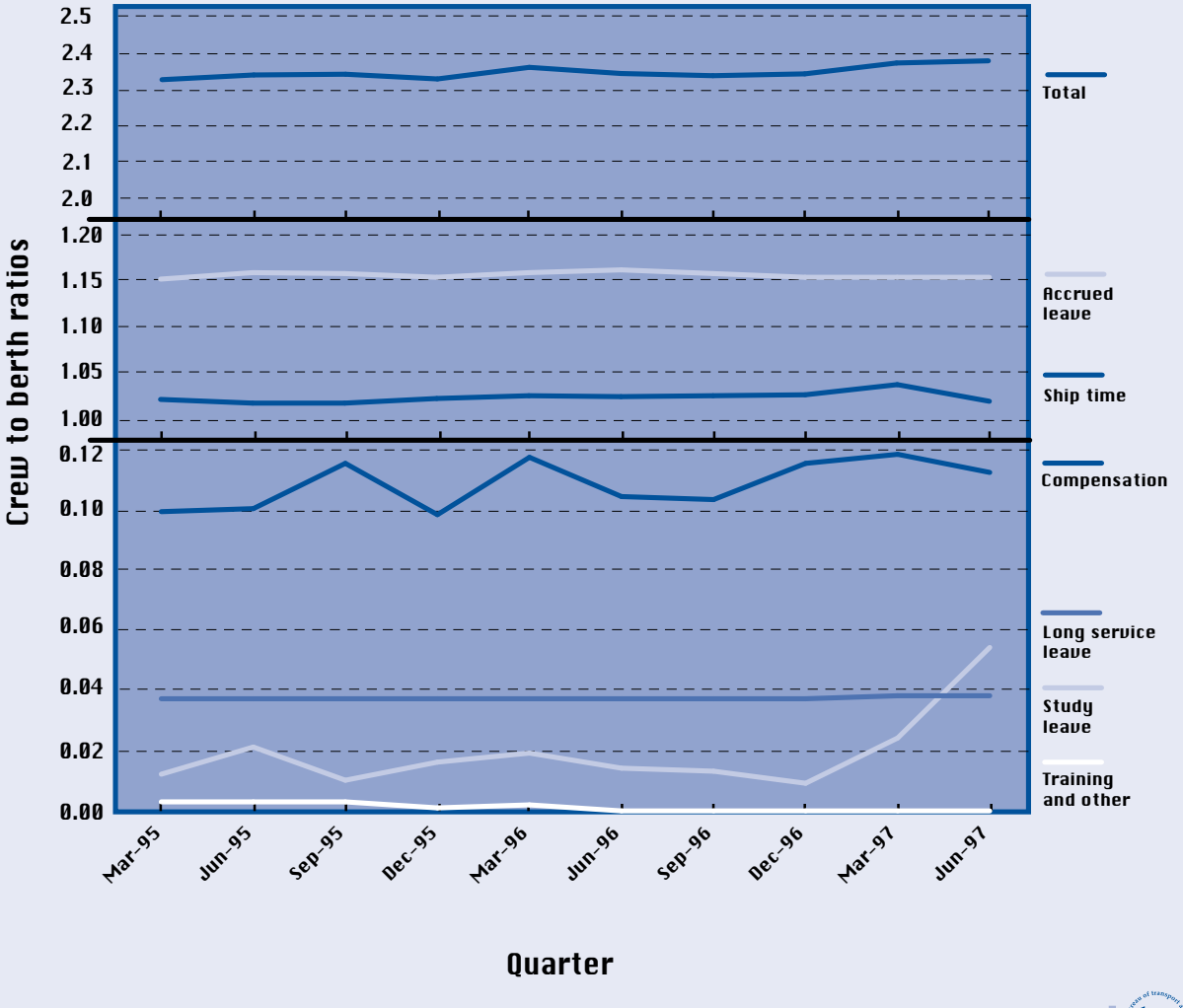
FIGURES

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING



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TABLES

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS—CONTAINERS PER HOUR

	Quarter						
Port/indicator	**Dec-95**	**Mar-96**	**Jun-96**	**Sep-96**	**Dec-96**	**Mar-97**	**Jun-97**
Brisbane							
Crane rate	15.8	17.6	16.7	16.5	16.9	17.3	16.4
Elapsed rate	17.0	19.0	17.2	17.2	17.4	17.3	16.6
Net rate	20.6	21.5	20.4	20.4	20.4	19.4	18.7
Sydney							
Crane rate	15.0	15.6	16.0	16.1	15.4	14.9[p]	17.7[p]
Elapsed rate	17.6	18.9	17.6	18.2	a	18.2	18.5
Net rate	21.0	22.1	22.4	23.3	22.7	20.0[p]	25.5[p]
Melbourne							
Crane rate	16.3	17.0	18.4	19.6	17.8	19.0	19.0
Elapsed rate	18.8	20.2	20.5	21.1	17.9	19.5	20.3
Net rate	21.9	23.4	25.9	25.6	21.7	23.0	24.0
Adelaide							
Crane rate	18.8	18.9	18.2	19.3	19.6	19.6	21.0
Elapsed rate	22.8	23.3	22.0	22.2	22.6	24.0	28.3
Net rate	23.3	23.8	22.5	22.8	23.1	24.6	29.1
Fremantle							
Crane rate	16.2	17.9	20.0	17.8	18.2	19.4	19.0
Elapsed rate	13.4	15.7	14.8	13.4	15.6	16.2	15.9
Net rate	16.7	18.9	20.0	19.4	20.5	20.6	19.8
Five ports							
Crane rate	15.9	16.9	17.7	18.0	17.1	17.4[p]	18.3[p]
Elapsed rate	17.7	19.3	18.6	19.0	a	18.6	19.0
Net rate	20.9	22.3	23.4	23.5	21.8	21.3[p]	23.6[p]

p *Provisional. One Sydney terminal operator has updated its systems to improve the processing of data on non-working time. The non-operational delays recorded at that terminal are now almost 50 per cent higher than in previous quarters. Productivity has improved in Sydney during 1997, but the changed reporting processes have contributed to part of the reported June quarter increase for that port. The March and June quarter figures may be subject to change following further review of the data.*

a. *Data not available at time of publication.*

Notes *1. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.*

2. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 10.

Sources *Patrick, P&O Ports and SeaLand.*

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TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT SCHEDULED/CONFIRMED TIME, JUNE QUARTER 1997

(Number of ship calls)

	Delay (hrs)								Total no. of ship calls
Port/operation	**0**	**1**	**2**	**3**	**4**	**5–10**	**11–20**	**>20**	
Brisbane									
Berth availability	24	0	0	0	0	1	1	2	28
Pilotage	27	1	0	0	0	0	0	0	28
Towage	28	0	0	0	0	0	0	0	28
Sydney									
Berth availability	60	0	0	0	0	3	4	1	68
Pilotage	67	0	0	0	0	0	1	0	68
Towage	67	0	0	0	0	1	0	0	68
Melbourne									
Berth availability	69	0	1	2	0	4	2	1	79
Pilotage	79	0	0	0	0	0	0	0	79
Towage	79	0	0	0	0	0	0	0	79
Adelaide									
Berth availability	24	0	0	1	0	1	1	0	27
Pilotage	27	0	0	0	0	0	0	0	27
Towage	26	1	0	0	0	0	0	0	27
Fremantle									
Berth availability	47	0	0	0	0	1	1	1	50
Pilotage	50	0	0	0	0	0	0	0	50
Towage	49	0	0	1	0	0	0	0	50
Five ports									
Berth availability	224	0	1	3	0	10	9	5	252
Pilotage	250	1	0	0	0	0	1	0	252
Towage	249	1	0	1	0	1	0	0	252

Note *Data for individual ports should be interpreted with caution as there may be significant inter-port variation in factors such as the proportion of ship calls that involve fixed-day sailings.*

Source *Data provided by shipping lines.*

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TABLE 3 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1996/97

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
LOA (metres)	-	-	-	-	176	176	-	-	-	-
Teus exchanged[a]										
Total	377	346	725	713	699	697	206	207	291	330
Loaded	292	267	600	597	590	596	161	172	242	276
Empty	85	79	125	116	109	101	45	35	49	54
Loaded inwards	124	111	375	364	309	305	56	63	126	140
Loaded outwards	168	156	225	233	281	291	105	109	116	136
Primary produce	-	-	-	-	-	-	41	41	-	-
Ship call parameters[a]										
Number of port calls	3	3	3	4	3	3	4	4	5	7
Elapsed berth time (hrs)	23	23	41	39	35	35	15	15	20	18

- not required.

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

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

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TABLE 4 PORT AND RELATED CHARGES, 1996/97

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997
Ship-based charges ($/teu)										
Conservancy	8.35	6.46	-	-	-	-	7.31	7.27	2.72	1.60
Tonnage	-	-	9.73	9.90	9.85	9.88	18.10	17.99	8.69	7.68
Pilotage	13.60	14.81	4.69	4.77	7.85	7.87	11.43	11.37	7.56	6.68
Towage	26.84	29.21	13.48	13.70	10.52	10.55	59.83	59.50	38.74	33.14
Mooring & unmooring	3.82	4.82	4.34	4.41	3.18	3.19	-	-	3.78	3.34
Berth hire[a]	-	-	-	-	12.00	11.87	-	-	-	-
Total[b]	52.61	55.30	32.25	32.78	43.40	43.37	96.67	96.13	61.49	52.43
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	37.40	37.40	65.00	65.00	49.79	49.79
Exports	26.00	26.00	45.00	45.00	37.40	37.40	61.09	61.20	49.79	49.79
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	14.63	14.63
Total port and related charges ($/teu)[b]										
Loaded imports	120.61	123.30	92.25	92.78	80.80	80.77	161.67	161.13	125.91	116.85
Loaded exports	120.61	123.30	77.25	77.78	80.80	80.77	157.77	157.34	125.91	116.85
Charges per ship visit ($/visit)										
Total ship-based charges	19840	19157	23380	23380	30330	30211	19873	19873	17902	17278
Empty teus[c]	1211	1126	1250	1160	1186	1099	0	0	397	437

- not applicable.

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

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

c. 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 BTCE estimates based on ship call data supplied by port authorities/corporations and price schedules of port authorities/corporations, towage operators and pilotage service providers.

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TABLE 5 PORT INTERFACE COSTS, 1996/97

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1996	Jan-Jun 1997
Imports										
Ship-based charges	53	55	32	33	43	43	97	96	61	52
Cargo-based charges	68	68	60	60	37	37	65	65	64	64
Stevedoring[p]	203	188	203	188	203	188	203	188	203	188
Customs brokers' fees	121	121	154	154	138	138	134	131	136	145
Road transport charges	174	176	287	288	248	251	156	157	188	192
Total imports[a]	619	609	737	722	670	658	654	638	654	642
Exports										
Ship-based charges	53	55	32	33	43	43	97	96	61	52
Cargo-based charges	68	68	45	45	37	37	61	61	64	64
Stevedoring[p]	203	188	203	188	203	188	203	188	203	188
Customs brokers' fees	79	78	110	110	89	89	71	71	74	73
Road transport charges	174	176	287	288	248	251	156	157	188	192
Total exports[a]	576	566	677	663	621	609	588	574	591	569

p Provisional pending updating of stevedoring charge using detailed survey data.

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

Notes 1. Based on parameters described in table 3.

2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons as sample characteristics may vary between ports.

3. The stevedoring charge used in Waterline is a weighted average for several major Australian ports. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTCE 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; and stevedoring charges data supplied by the ACCC and industry sources.

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TABLE 6 THE NATIONAL PORT INTERFACE COST INDEX

($/teu)

	Jul-Dec 1992	Jan-Jun 1993	Jul-Dec 1993	Jan-Jun 1994	Jul-Dec 1994	Jan-Jun 1995	Jul-Dec 1995	Jan-Jun 1996	Jul-Dec 1996	Jan-Jun 1997
Imports	696	675	670	690	684	697	696	689	684	671
Exports	617	608	612	633	624	633	636	633	629	615

Sources *BTCE 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; and stevedoring charges data supplied by the ACCC and industry sources.*

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TABLE 7 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1996/97

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five Ports[c]	
Indicator	**Jul-Dec 1996**	**Jan-Jun 1997**	**Jul-Dec 1996**	**Jan-Jun 1997**	**Jul-Dec 1996**	**Jan-Jun 1997**	**Jul-Dec 1996**	**Jan-Jun 1997**	**Jul-Dec 1996**	**Jan-Jun 1997**	**Jul-Dec 1996**	**Jan-Jun 1997**
Total cargo throughput ('000 tonnes)	9449	10740	10851	10482	9271	9188	2867	3118	10100 r	11836	42538 r	45364
Non-containerised general cargo ('000 tonnes)[a]	374	412	414	392	1071	959	151	129	307 r	353	2316 r	2245
Containerised cargo (teus exchanged)												
Full import	44765	43883	192764	180102	222273	209843	12144	13226	45420 r	44125	517366 r	491179
Empty import	22918	23720	10304	9419	37955	34265	8239	5866	9603 r	9318	89019 r	82588
Full export	60295	61627	116017	115636	201630	200601	22959	22895	41275 r	43079	442176 r	443838
Empty export	7774	7650	54032	52172	42350	35477	1668	1500	8942 r	7802	114766 r	104601
Total teus	135752	136880	3731 17	357329	504208	480186	45010	43487	105240 r	104324	1163327 r	1122206
Average total employment	236	213	243	229	69[d]	71[d]	205	204	203	191	956	907
Turnaround time (hrs)[b]												
Median result	31.6	30.3	41.0	36.1	38.0	39.0	18.5	17.0	26.8	22.7	-	-
95th percentile	51.3	53.7	73.9	68.8	77.9	68.6	38.8	28.3	66.5	53.5	-	-

- not applicable

r Revised to reflect changes to date range selection for Fremantle Port Authority's trade statistics.

a. Excludes bulk cargoes.

b. Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.

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

d. Applies to Melbourne Port Corporation only.

Source AAPMA

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TABLE 8 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, JUNE QUARTER 1997

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.036	0.965	0.021	0.035	0.060	0.018	2.134
Engineers	1.045	0.974	0.040	0.035	0.051	0.007	2.152
All officers	1.040	0.970	0.031	0.035	0.055	0.012	2.143
Integrated ratings	1.024	0.968	0.085	0.035	0.000	0.001	2.113
Catering crew	1.031	0.970	0.093	0.035	0.000	0.001	2.129
All ratings	1.026	0.969	0.087	0.035	0.000	0.001	2.118
All crew	1.033	0.969	0.061	0.035	0.025	0.006	2.130

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

Source Data provided by ship operators.

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TABLE 9 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, JUNE QUARTER 1997

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.019	1.153	0.072	0.040	0.157	0.000	2.442
Engineers	1.016	1.154	0.052	0.038	0.058	0.000	2.318
All officers	1.018	1.154	0.062	0.039	0.108	0.000	2.381
Integrated ratings	1.017	1.154	0.163	0.039	0.000	0.000	2.372
Catering crew	1.038	1.153	0.174	0.039	0.000	0.000	2.404
All ratings	1.020	1.153	0.165	0.039	0.000	0.000	2.377
All crew	1.019	1.153	0.113	0.039	0.055	0.000	2.379

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

Source Data provided by ship operators.

TABLE 10 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—TEUS PER HOUR

	Jun-92	Sep-92	. . . . .	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97
Brisbane																			
Ships handled	96	93	na	106	111	112	140	140	187	136	123	135	132	124	133	140	141	156	164
Total teus	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	39037	51008	66115	62904	47471	65572
Crane rate	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.6	20.6	20.0	20.5
Elapsed rate	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.5	20.5	20.9	21.1	20.3	20.6
Net rate	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.9	22.7	23.3
Sydney																			
Ships handled	109	112	na	205	238	177	240	223	221	218	202	192	203	206	216	228	249	251	249
Total teus	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	146038	148290	156344	174982	158323	167705
Crane rate	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.5	19.9	20.3	19.6	18.7[p]	22.6[p]
Elapsed rate	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.8	22.1	23.1	*a*	22.7	23.6
Net rate	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	28.0	27.9	29.5	28.9	25.1[p]	32.7[p]
Melbourne																			
Ships handled	121	121	na	235	306	211	265	267	244	265	228	221	227	228	262	274	282	230	249
Total teus	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	162911	170884	203371	202376	162156	177070
Crane rate	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3	24.5	22.4	23.6	23.5
Elapsed rate	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0	26.5	22.1	24.3	25.1
Net rate	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.7	32.2	27.2	28.7	29.7
Adelaide																			
Ships handled	20	21	na	21	26	28	34	31	33	35	50	34	42	47	63	70	74	69	65
Total teus	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	23351	21963	20933
Crane rate	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	24.0	24.6	26.0
Elapsed rate	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	27.7	30.2	35.1
Net rate	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	28.3	30.9	36.0
Fremantle																			
Ships handled	75	72	na	116	115	127	135	121	124	128	136	139	124	143	153	159	161	159	164
Total teus	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	47597	51113	50791	55593	51784	52092
Crane rate	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4	20.8	21.5	23.3	22.9
Elapsed rate	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.3	17.6	16.0	18.6	19.7	19.5
Net rate	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5	22.6	24.2	25.0	24.0
Five ports																			
Ships handled	421	419	na	683	796	655	814	782	809	782	739	721	728	748	827	871	907	865	891
Total teus	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	411538	440098	497140	519206	441697	483372
Crane rate	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.3	22.3	21.2	21.5[p]	22.8[p]
Elapsed rate	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6	23.6	*a*	23.1	23.8
Net rate	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	27.1	28.5	29.1	27.2	26.4[p]	29.5[p]

na not available

p Provisional. One Sydney terminal operator has updated its systems to improve the processing of data on non-working time. The non-operational delays recorded at that terminal are now almost 50 per cent higher than in previous quarters. Productivity has improved in Sydney during 1997, but the changed reporting processes have contributed to part of the reported June quarter increase for that port. The March and June quarter figures may be subject to change following further review of the data.

a. Data not available at time of publication.

Notes 1. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and excluded from the measure of time in later quarters. This means that rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

3. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ACCC	Australian Competition and Consumer Commission
BTCE	Bureau of Transport and Communications Economics
GRT	Gross Registered Tonnage
LOA	Length Overall
NRT	Net Registered Tonnage
teu	Twenty-foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

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WATERLINE

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BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

FROM THE DIRECTOR

This issue of *Waterline* contains our quarterly articles on stevedoring productivity, waterfront reliability and crew to berth ratios.

Our next issue will be published in March 1998. It will include the usual quarterly articles as well as information on port interface costs, port performance (non-financial) and port authority/corporation performance (financial).

I would like to take this opportunity to wish our readers a safe and happy Christmas.

David Luck
Acting Director

IN BRIEF

Stevedoring productivity

The five-port average crane rate was 18.3 containers per hour in the September quarter, the same as the figure for the June quarter.

Crane rates increased at Sydney (18.2 containers per hour) and Adelaide (21.1 containers per hour). There were declines at Brisbane (16.1 containers per hour), Melbourne (18.6 containers per hour) and Fremantle (18.8 containers per hour).

The five-port average net rate increased to 24.3 containers per hour in the September quarter (from 23.6 containers per hour). Net rates rose at all ports except Melbourne.

The five-port average elapsed rate was 20.4 containers per hour in the September quarter (up from 19.0 containers per hour). Elapsed rates increased at all ports.

page two

Waterfront reliability

Data for a new *Waterline* series indicate that there is significant inter-port variation in the accuracy of ship arrival advice provided at the mainland capital city ports. Other information suggests significant variation in the accuracy of stevedoring completion time estimates.

The BTCE survey of container ship calls indicates that berth availability within four hours of the scheduled time was 89 per cent in the September quarter. Availability of pilots and tugs within one hour of the confirmed time was 99-100 per cent.

Around 40 per cent of the ship calls in the BTCE survey were affected by other waiting time in the September quarter.

page three

Crew to berth ratios

The crew to berth ratio for merchant shipping increased to an estimated level of 2.152 in the September quarter. This was above the initial ratio of 2.133 that was recorded at the beginning of the monitoring process in 1993.

The crew to berth ratio for offshore shipping was 2.366 in the September quarter, down from the peak figure of 2.379 in the June quarter. The decline mainly reflected falls in the ship time and study leave ratios, which more than offset a rise in the compensation leave ratio. The September quarter crew to berth ratio was higher than the initial ratio of 2.327 that was recorded in 1995.

page seven

STEVEDORING PRODUCTIVITY

Table 1 presents information on stevedoring productivity at Australia's major container terminals over the period to the end of the September quarter 1997. The indicators are expressed in containers per hour which provides the most rigorous basis for monitoring changes in productivity.

The data for Brisbane, Sydney, Melbourne and Fremantle are averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the SeaLand terminal.

Five-port average

Table 1 indicates that the five-port average *crane rate* (productivity per crane while the ship is worked) was 18.3 containers per hour in the September quarter, the same as the figure for the June quarter.

The five-port average *net rate* (total productivity while the ship is worked) increased to 24.3 containers per hour in the September quarter from 23.6 containers per hour in the June quarter. The increase reflected a slight rise in overall crane intensity (the average number of cranes used to work the ship) over the period.

The five-port average *elapsed rate* (total productivity based on the time labour is aboard the ship) was 20.4 containers per hour in the September quarter, up from 19.0 containers per hour in the June quarter. A reduction in the overall proportion of non-working time at the five ports contributed to the increase in the elapsed rate.

Brisbane

Brisbane's crane rate declined in the September quarter but there were increases in the net rate and the elapsed rate.

The crane rate was 16.1 containers per hour in the September quarter, down from 16.4 containers per hour in the June quarter.

The net rate increased to 19.1 containers per hour, from 18.7 containers per hour in the previous quarter. The increase in the net rate reflected a rise in average crane intensity over the period.

Brisbane's elapsed rate was 16.8 containers per hour in the September quarter, up from 16.6 containers per hour in the June quarter.

The average proportion of elapsed time not worked was 11.7 per cent at Brisbane in the September quarter. This was similar to the June quarter figure of 11.5 per cent.

Sydney

Sydney's stevedoring productivity improved in the September quarter.

The crane rate was 18.2 containers per hour, up from 17.7 containers per hour in the previous quarter.

The net rate increased to 27.9 containers per hour in the September quarter from 25.5 containers per hour in the June quarter. The increase in the net rate partly reflected a rise in average crane intensity following the introduction of new crane working arrangements.

Sydney's elapsed rate was 21.7 containers per hour in the September quarter, up from 18.5 containers per hour in the June quarter. The increase in the elapsed rate partly reflected a reduction in the proportion of non-working time. The average proportion of elapsed time not worked was 22.4 per cent in the September quarter compared with 27.6 per cent in the June quarter.

As noted in *Waterline* 12, an updated information system has become operational at one of the Sydney terminals during 1997. Following a review of sample data for 1996, the terminal operator has supplied information which indicates that the new system is providing more accurate information on non-working time than the previous reporting arrangements. Data from the new system are available back to the March quarter 1997.

Melbourne

Melbourne's crane rate and net rate declined in the September quarter, but there was an increase in the elapsed rate.

The crane rate was 18.6 containers per hour in the September quarter, down from 19.0 containers per hour in the June quarter.

The net rate declined to 23.5 containers per hour, from 24.0 containers per hour in the previous quarter. As crane intensity was virtually unchanged, the reduction in the net rate was attributable to the decline in the crane rate.

Melbourne's elapsed rate was 20.5 containers per hour in the September quarter, up from 20.3 containers per hour in the June quarter. The increase in the elapsed rate reflected a reduction in the proportion of non-working time. The average proportion of elapsed time not worked was 13.0 per cent in the September quarter compared with 15.4 per cent in the June quarter.

Adelaide

Adelaide's stevedoring productivity increased marginally in the September quarter.

The crane rate was 21.1 containers per hour, up from 21.0 containers per hour in the previous quarter.

The net rate rose to 29.2 containers per hour in the September quarter from 29.1 containers per hour in the June quarter.

Adelaide's elapsed rate was 28.4 containers per hour in the September quarter, up from 28.3 containers per hour in the June quarter.

The average proportion of elapsed time not worked was unchanged at 2.7 per cent in the September quarter.

Fremantle

Fremantle's crane rate declined in the September quarter but there were increases in the net rate and the elapsed rate.

The crane rate was 18.8 containers per hour in the September quarter, down from 19.0 containers per hour in the June quarter.

The net rate increased to 20.6 containers per hour, from 19.8 containers per hour in the previous quarter. The increase in the net rate reflected a rise in average crane intensity.

Fremantle's elapsed rate was 17.0 containers per hour in the September quarter, up from 15.9 containers per hour in the June quarter. The increase in the elapsed rate partly reflected a reduction in the proportion of non-working time. The average proportion of elapsed time not worked was 17.6 per cent in the September quarter compared with 19.5 per cent in the June quarter.

Teus per hour

Figures 1 to 6 and table 6 present the stevedoring productivity indicators in terms of *teus* per hour. These data are retained in *Waterline* for the purposes of long-term historical comparison. They are not directly comparable with the data in table 1 which are expressed in *containers* per hour. Indicators based on teus per hour may be affected by changes over time in the mix of 20 foot and 40 foot containers.

The teu-based and container-based data generally indicate similar trends in productivity in the September quarter. The major exceptions involve Melbourne (crane rate and net rate) and Fremantle (crane rate) where there were significant changes in the mix of 20 foot and 40 foot containers over the period.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability and predictability of waterfront performance for container traffic. This article provides data up to the September quarter 1997.

Ship arrival

Accurate forecasts of ship arrival times facilitate the provision of port services at the times required by shipping lines. Table 2 presents data for two indicators of the accuracy of ship arrival advice at four Australian ports.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS—CONTAINERS PER HOUR

	Quarter							
Port/indicator	**Dec-95**	**Mar-96**	**Jun-96**	**Sep-96**	**Dec-96**	**Mar-97**	**Jun-97**	**Sep-97**
Brisbane								
Crane rate	15.8	17.6	16.7	16.5	16.9	17.3	16.4	16.1
Elapsed rate	17.0	19.0	17.2	17.2	17.4	17.3	16.6	16.8
Net rate	20.6	21.5	20.4	20.4	20.4	19.4	18.7	19.1
Sydney								
Crane rate	15.0	15.6	16.0	16.1	15.4	17.7[r]	17.7	18.2
Elapsed rate	17.6	18.9	17.6	18.2	na	18.2	18.5	21.7
Net rate	21.0	22.1	22.4	23.3	22.7	25.7[r]	25.5	27.9
Melbourne								
Crane rate	16.3	17.0	18.4	19.6	17.8	19.0	19.0	18.6
Elapsed rate	18.8	20.2	20.5	21.1	17.9	19.5	20.3	20.5
Net rate	21.9	23.4	25.9	25.6	21.7	23.0	24.0	23.5
Adelaide								
Crane rate	18.8	18.9	18.2	19.3	19.6	19.6	21.0	21.1
Elapsed rate	22.8	23.3	22.0	22.2	22.6	24.0	28.3	28.4
Net rate	23.3	23.8	22.5	22.8	23.1	24.6	29.1	29.2
Fremantle								
Crane rate	16.2	17.9	20.0	17.8	18.2	19.4	19.0	18.8
Elapsed rate	13.4	15.7	14.8	13.4	15.6	16.2	15.9	17.0
Net rate	16.7	18.9	20.0	19.4	20.5	20.6	19.8	20.6
Five ports								
Crane rate	15.9	16.9	17.7	18.0	17.1	18.4[r]	18.3	18.3
Elapsed rate	17.7	19.3	18.6	19.0	na	18.6	19.0	20.4
Net rate	20.9	22.3	23.4	23.5	21.8	23.4[r]	23.6	24.3

na not available

r Revised to incorporate amended data provided by a Sydney terminal operator which has updated its information systems.

Notes 1. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

2. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 6.

Sources Patrick, P&O Ports and SeaLand.

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE—TEUS PER HOUR

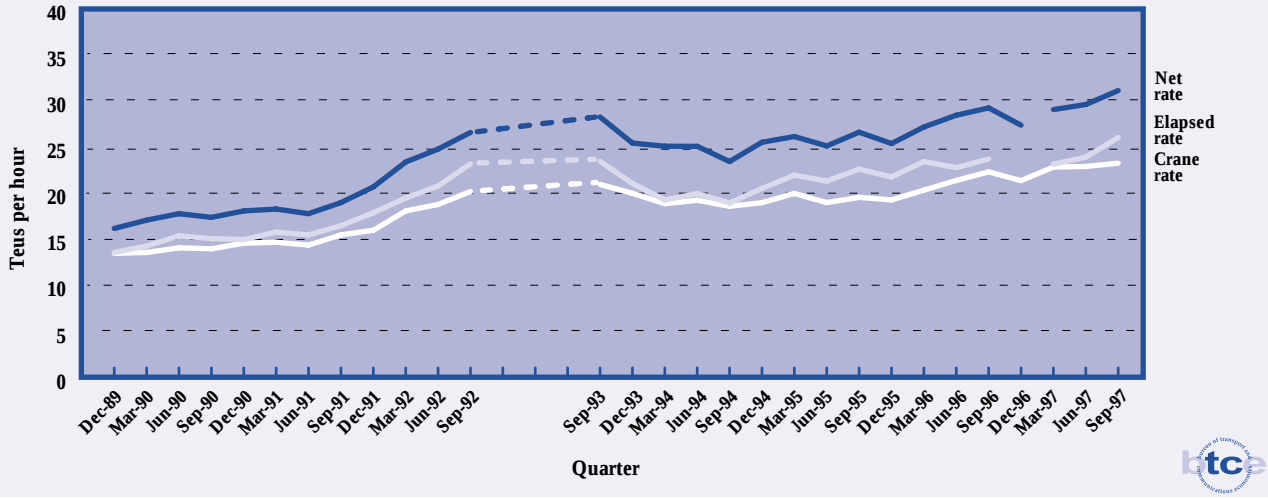


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR

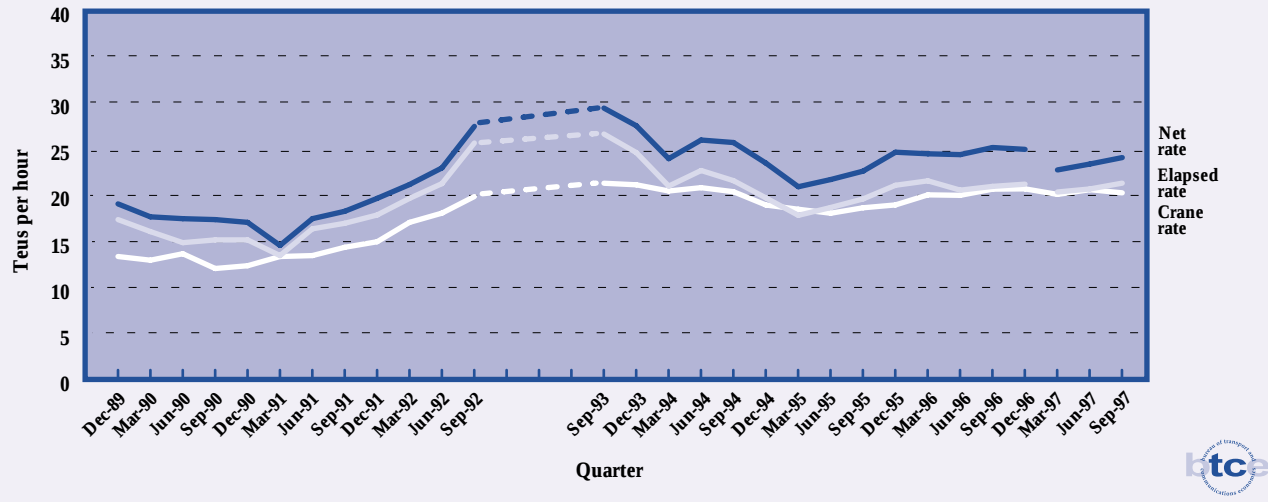
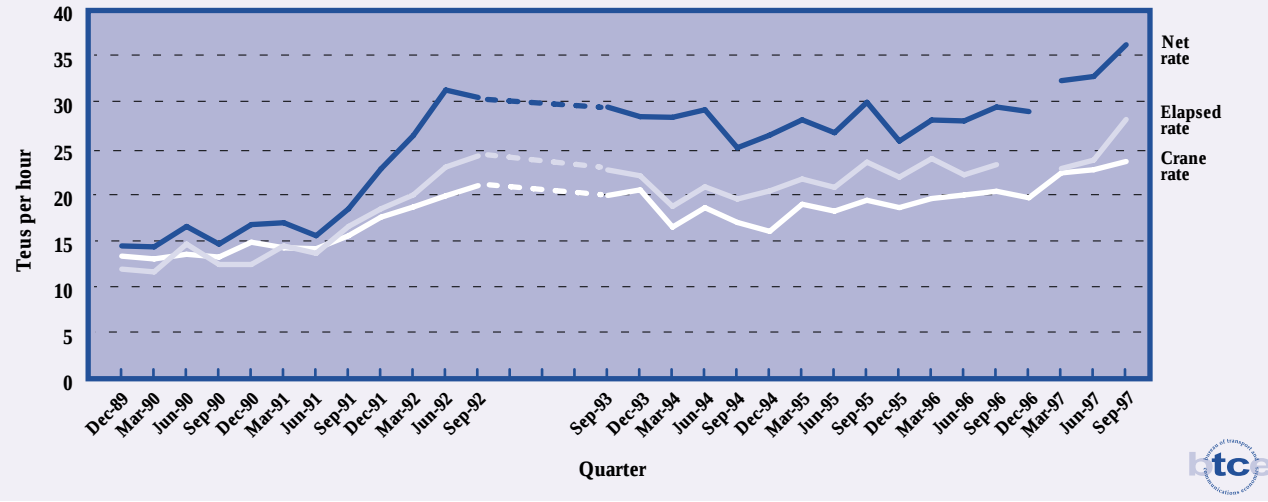


FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR



Notes *Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and are excluded from the measure of time in later quarters. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR

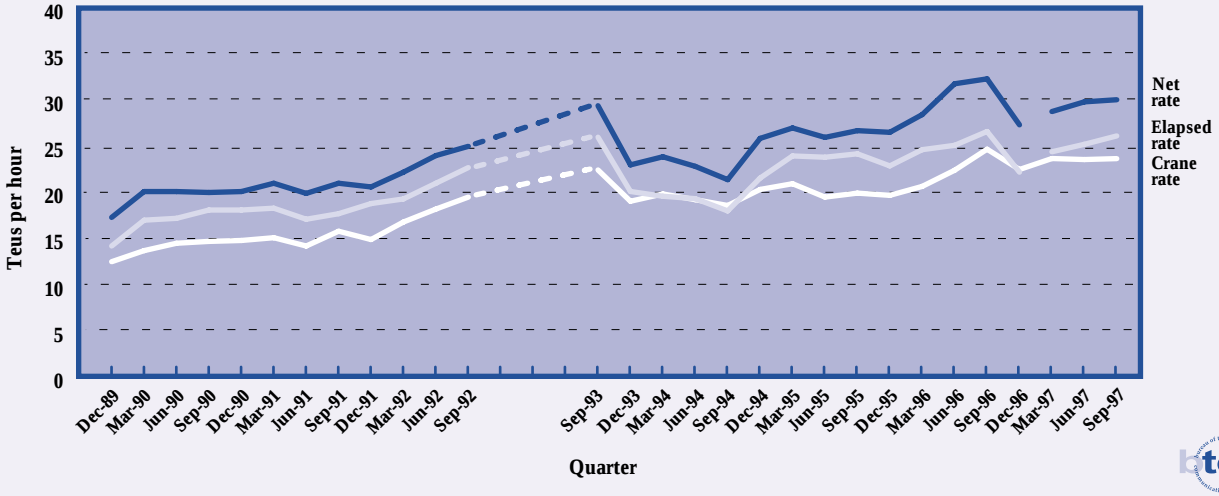


FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE—TEUS PER HOUR

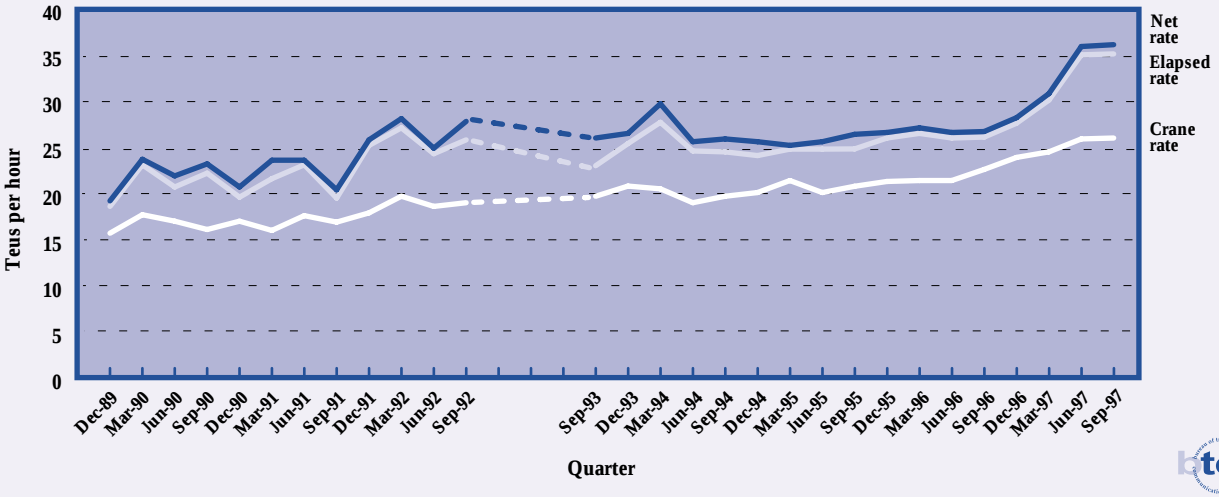
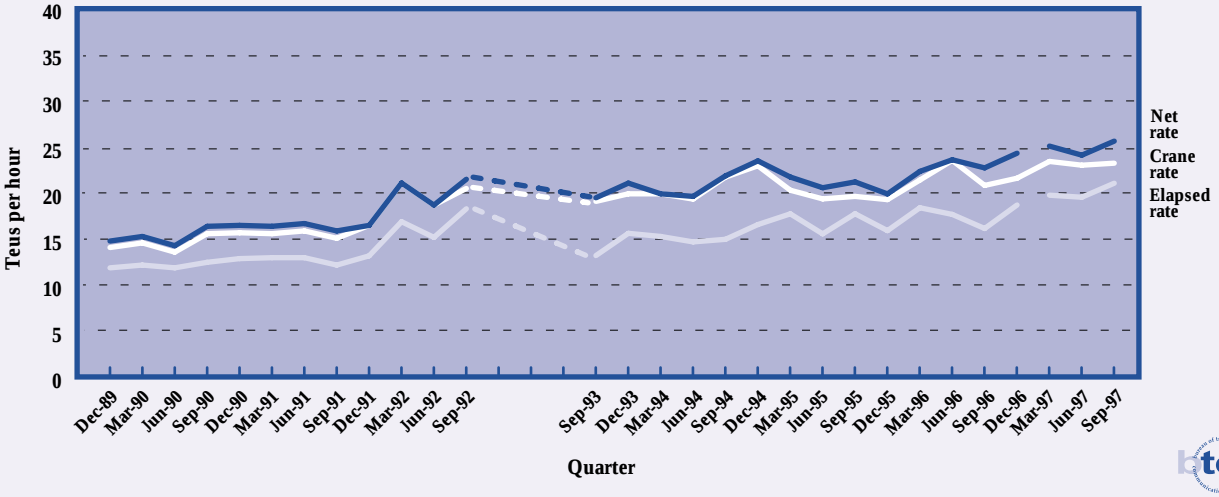


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR



Notes *Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and are excluded from the measure of time in later quarters. Data are unavailable for December quarter 1992 to June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

authority/corporation *at 24 hours prior to actual arrival*. The proportion at individual ports varied between 53 per cent and 80 per cent in the September quarter. The major changes from the previous quarter were significant increases at Adelaide and Fremantle.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. The proportions at Brisbane, Sydney and Fremantle ranged from 53 per cent to 92 per cent in the September quarter. This was similar to the range in the June quarter.

Table 2 indicates that there is significant inter-port variation in the accuracy of ship arrival advice at individual ports. The variation potentially reflects a range of operational factors such as differences in weather conditions and the position of each port in the coastal cycle.

Berth availability, pilotage, towage

Table 3 presents information on berth availability, pilotage and towage for container ships at the five mainland capital city ports in the September quarter. The sample covers 263 ship calls, equivalent to 29 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 22 per cent at Brisbane and Sydney to 50 per cent at Adelaide.

Berth availability indicates the proportion of ship arrivals where the berth is available within 4 hours of the scheduled berthing time. The overall proportion for the ships in the BTCE sample was 89 per cent in the September quarter, similar to the figure of 90 per cent in the June quarter. Shipping lines indicated that the major factor contributing to delays in the September quarter was berth congestion.

Pilotage measures the proportion of ship movements where the pilot is available to board the ship within one hour of the confirmed ship arrival/departure time. The proportion was 100 per cent in the September quarter compared with 99.6 per cent in the June quarter.

Towage indicates the proportion of ship movements where the tug is available to assist the ship within one hour of the confirmed ship arrival/departure time. The overall proportion for ships in the BTCE sample was 98.9 per cent in the September quarter, similar to the June quarter figure of 99.2 per cent.

Stevedoring

Table 2 presents information on three aspects of stevedoring reliability at the major container terminals—cargo receival, stevedoring completion and stevedoring rate.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off. Cargo receival at Brisbane, Sydney and Melbourne averaged 93–94 per cent in the September quarter. This was similar to the range in the June quarter. Data for Fremantle are not available as one terminal operator was upgrading its computer system during the period covered by table 2.

Stevedoring completion is the proportion of ship visits where stevedoring completion time is within one hour (plus or minus) of the time initially agreed when the overall work program for the ship is prepared. *Waterline* 12 reported figures of 72 per cent at Brisbane and 27 per cent at Sydney in the March quarter. Information on stevedoring completion is not included in table 2 because the most recent data provided to the BTCE cover only single terminals at Brisbane, Sydney, Melbourne and Fremantle. However, the June and September quarter data for these terminals also suggest significant inter-port variation in stevedoring completion. It is expected that data on stevedoring completion will be published in future issues of *Waterline*.

Stevedoring rate is the proportion of ship visits where the average crane rate for the ship is within 2 containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The figures for Brisbane, Sydney and Melbourne increased slightly to 61–62 per cent in the September quarter. Data for Fremantle are not

TABLE 2 SHIP ARRIVAL AND STEVEDORING RELIABILITY INDICATORS, JUNE AND SEPTEMBER QUARTERS 1997

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**
Ship arrival										
Advice at 24 hrs	63	63	56	53	na	na	50	80	49	58
Advice inside 24 hrs	56	53	93	92	na	na	na	na	75	81
Stevedoring										
Cargo receival	93	93	92	93	96	94	na	na	na	na
Stevedoring completion	na	na	na	na	na	na	na	na	na	na
Stevedoring rate	58	61	57	62	59	62	na	na	na	na

na not available

Sources AAPMA, Patrick and P&O Ports.

available due to the upgrading of one terminal operator's computer system during the period.

Other waiting time

The nine shipping lines which supplied data on berth availability, pilotage and towage for table 3 also provided information on other waiting time. The data indicate that 106 ship calls (40 per cent of all calls in the sample) were affected by other waiting time (excluding ship schedule adjustments) in the September quarter. There were 106 ship calls (42 per cent of calls) affected by other waiting time in the previous quarter.

Specific information on the sources of other waiting time was provided for 86 ship calls in the September quarter. Some ship calls were affected by two or three incidents. The average waiting time attributed to each incident was 6 hours. Five factors accounted for 64 per cent of the waiting time incidents for which specific information was available in the September quarter:

- early completion of stevedoring—18 ship calls (including 8 at Melbourne and 5 at Adelaide), with waiting time ranging from 1 hour to 9 hours;
- early ship arrival—15 ship calls (including 9 at Melbourne and 5 at Adelaide), with waiting time ranging from 1 hour to 33 hours;
- awaiting labour—14 ship calls (including 6 at Melbourne and 5 at Sydney), with waiting time ranging from 3 hours to 12 hours;
- crane breakdown—13 ship calls (including 6 at Melbourne and 5 at Brisbane), with waiting time ranging from 1 hour to 8 hours; and
- industrial action—8 ship calls (including 4 at Melbourne and 2 at Sydney), with waiting time ranging from 2 hours to 14 hours.

Other sources of waiting time reported by shipping lines included booking times later than preferred times, ship repairs and maintenance, weather and tides.

Concluding comments

There appears to be significant inter-port variation in the accuracy of ship arrival advice provided at the mainland capital city ports. The available data also suggest significant variation in the accuracy of stevedoring completion time estimates.

The availability of berths, pilots and tugs at the scheduled time was virtually unchanged in the September quarter. A sample of container ship calls indicates that around 40 per cent of calls at the mainland capital city ports were affected by other waiting time.

CREW TO BERTH RATIOS

The BTCE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The results of the monitoring process have been reported in *Waterline* since the December 1996 issue.

This article updates the information on crew to berth ratios for Australian merchant and offshore shipping with data for the September quarter 1997.

Merchant shipping

Figure 7 presents information on the crew to berth ratio, and its components, for Australian merchant shipping over the period to the September quarter 1997.

Following discussions with the BTCE, two major ship operators have revised their data for the March and June quarters. The

TABLE 3 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT SCHEDULED/CONFIRMED TIME, SEPTEMBER QUARTER 1997

(Number of ship calls)

	Delay (hrs)								Total no. of ship calls
Port/operation	0	1	2	3	4	5-10	11-20	>20	
Brisbane									
Berth availability	32	0	0	0	0	1	1	1	35
Pilotage	35	0	0	0	0	0	0	0	35
Towage	34	0	1	0	0	0	0	0	35
Sydney									
Berth availability	42	1	0	0	1	5	3	2	54
Pilotage	54	0	0	0	0	0	0	0	54
Towage	53	0	0	0	0	0	1	0	54
Melbourne									
Berth availability	70	0	2	1	2	2	3	3	83
Pilotage	83	0	0	0	0	0	0	0	83
Towage	83	0	0	0	0	0	0	0	83
Adelaide									
Berth availability	30	0	0	0	0	2	0	2	34
Pilotage	34	0	0	0	0	0	0	0	34
Towage	33	0	0	0	0	1	0	0	34
Fremantle									
Berth availability	51	0	0	1	0	2	2	1	57
Pilotage	57	0	0	0	0	0	0	0	57
Towage	57	0	0	0	0	0	0	0	57
Five ports									
Berth availability	225	1	2	2	3	12	9	9	263
Pilotage	263	0	0	0	0	0	0	0	263
Towage	260	0	1	0	0	1	1	0	263

Note *Data for individual ports should be interpreted with caution as there may be significant inter-port variation in factors such as the proportion of ship calls that involve fixed-day sailings*

Source *Data provided by shipping lines.*

revisions mainly involve study leave, and there have also been some changes to the figures for berth days. The revised crew to berth ratio for the June quarter is 2.145 (previously 2.130). Some components of the March quarter figures have also been revised but the overall ratio for that quarter is unchanged. As the BTCE is still auditing the processes used by one major ship operator, the September quarter merchant shipping data in this issue of *Waterline* are classified as preliminary.

The *crew to berth ratio* for merchant shipping was 2.152 (preliminary) in the September quarter, up from the revised June quarter figure of 2.145. The September quarter figure was higher than the initial crew to berth ratio recorded at the beginning of the monitoring process (2.133 in the September quarter 1993).

Ship time is the largest component of the crew to berth ratio for merchant shipping. The ship time ratio was 1.035 in the September quarter, up from 1.031 (revised) in the June quarter (initial level 1.025).

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35-hour week. The accrued leave ratio was 0.967 in the September quarter compared with 0.965 (revised) in the June quarter (initial level 0.971).

Compensation leave is the third largest component of the crew to berth ratio for merchant shipping. The compensation leave ratio increased to 0.066 in the September quarter from 0.062 (revised) in the June quarter (initial level 0.073).

The *long service leave* ratio for merchant shipping was unchanged at 0.035 in the September quarter (initial level 0.035).

The *study leave* ratio fell to 0.041 in the September quarter from the peak of 0.046 (revised) in the June quarter (initial level 0.024).

The *training and other paid leave* ratio was 0.008 in the September quarter compared with 0.006 in the June quarter (initial level 0.006).

Table 4 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, in the September quarter. Deck officers had the highest ratio (2.218) followed by engineers (2.202), integrated ratings (2.104) and catering crew (2.102).

Offshore shipping

Figure 8 presents information on the crew to berth ratio, and its components, for Australian offshore shipping over the period to the September quarter 1997.

The *crew to berth ratio* for offshore shipping was 2.366 in the September quarter, down from the peak figure of 2.379 recorded in the June quarter. The decline mainly reflected falls in the ship time and study leave ratios, which more than offset a rise in the compensation ratio. The September quarter figure was higher than the initial crew to berth ratio at the beginning of the monitoring process (2.327 in the March quarter 1995).

Accrued leave is the largest component of the crew to berth ratio for offshore shipping. It comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two-crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio was unchanged at 1.153 in the September quarter (initial level 1.151).

Ship time reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio was 1.010 in the September quarter, down from 1.019 in the June quarter (initial level 1.021).

Compensation leave is the third largest component of the crew to berth ratio for offshore shipping. The compensation leave ratio increased to 0.121 in the September quarter from 0.113 in the June quarter. The September quarter figure was the highest compensation leave ratio for offshore shipping since the beginning of the monitoring process (initial level 0.100).

The *long service leave* ratio for offshore shipping was unchanged at 0.039 in the September quarter (initial level 0.038).

The *study leave* ratio declined to 0.042 in the September quarter from the peak of 0.055 recorded in the June quarter (initial level 0.013).

The *training and other paid leave* ratio was 0.002 in the September quarter compared with 0.000 in the June quarter (initial level 0.003).

Table 5 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, in the September quarter. Catering crew had the highest ratio (2.435) followed by integrated ratings (2.388), engineers (2.342) and deck officers (2.334).

Concluding comments

Preliminary data indicate that the crew to berth ratio for merchant shipping increased to 2.152 in the September quarter. This was above the initial figure of 2.133 that was recorded at the beginning of the monitoring process in 1993.

The crew to berth ratio for offshore shipping was 2.366 in the September quarter, down from the peak figure of 2.379 in the June quarter. The September quarter figure was higher than the initial crew to berth ratio of 2.327 that was recorded 1995.

FIGURE 7 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

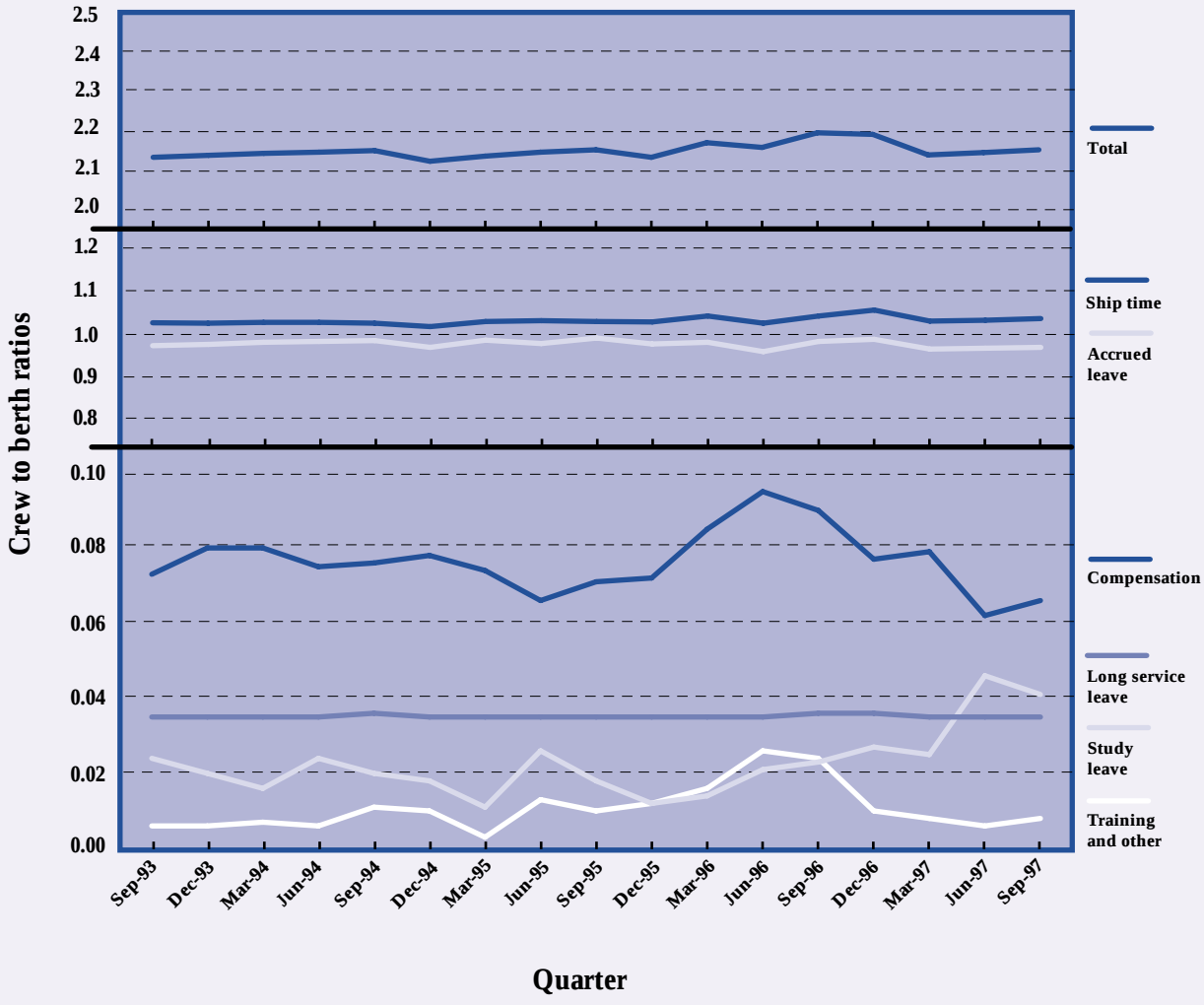


TABLE 4 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1997[P]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.057	0.977	0.036	0.036	0.090	0.021	2.218
Engineers	1.046	0.978	0.040	0.036	0.087	0.013	2.202
All officers	1.052	0.978	0.038	0.036	0.089	0.017	2.210
Integrated ratings	1.021	0.961	0.087	0.034	0.000	0.001	2.104
Catering crew	1.023	0.948	0.096	0.034	0.000	0.001	2.102
All ratings	1.022	0.957	0.090	0.034	0.000	0.001	2.104
All crew	1.035	0.967	0.066	0.035	0.041	0.008	2.152

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

p. Preliminary.

Source Data provided by ship operators.

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

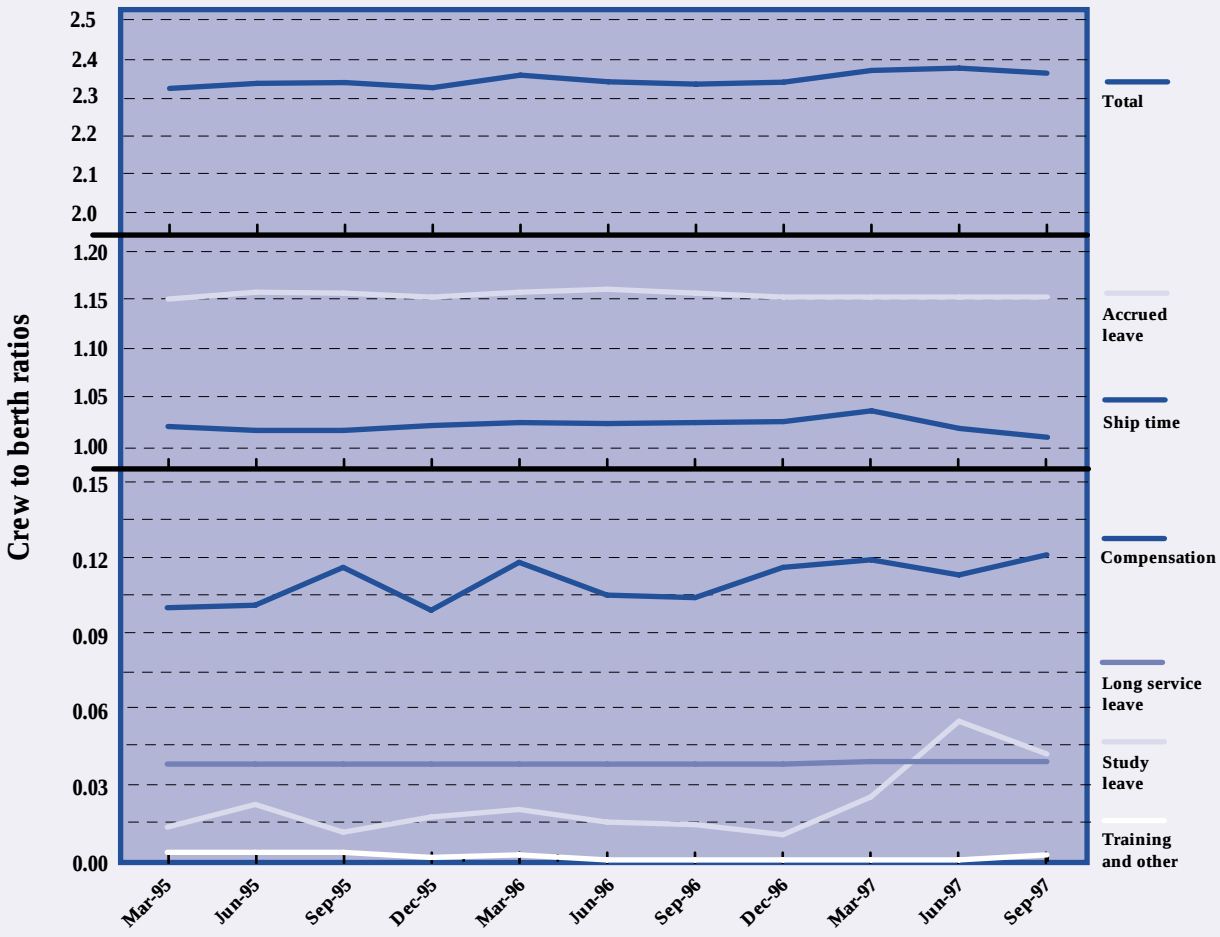


TABLE 5 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1997

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.008	1.153	0.046	0.038	0.086	0.004	2.334
Engineers	1.009	1.153	0.058	0.038	0.081	0.002	2.342
All officers	1.008	1.153	0.052	0.038	0.084	0.003	2.338
Integrated ratings	1.010	1.153	0.187	0.039	0.000	0.000	2.388
Catering crew	1.024	1.153	0.218	0.040	0.000	0.000	2.435
All ratings	1.011	1.153	0.190	0.039	0.000	0.000	2.394
All crew	1.010	1.153	0.121	0.039	0.042	0.002	2.366

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

Source Data provided by ship operators.

TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—TEUS PER HOUR

	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97
Brisbane																	
Ships handled	106	111	112	140	140	187	136	123	135	132	124	133	140	141	156	164	162
Total teus	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	39037	51008	66115	62904	47471	65572	73184
Crane rate	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.6	20.6	20.0	20.5	20.2
Elapsed rate	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.5	20.5	20.9	21.1	20.3	20.6	21.2
Net rate	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.9	22.7	23.3	24.0
Sydney																	
Ships handled	205	238	177	240	223	221	218	202	192	203	206	216	228	249	251	249	243
Total teus	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	146038	148290	156344	174982	158323	167705	183978
Crane rate	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.5	19.9	20.3	19.6	22.3[r]	22.6	23.5
Elapsed rate	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.8	22.1	23.1	na	22.7	23.6	28.0
Net rate	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	28.0	27.9	29.5	28.9	32.2[r]	32.7	36.1
Melbourne																	
Ships handled	235	306	211	265	267	244	265	228	221	227	228	262	274	282	230	249	268
Total teus	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	162911	170884	203371	202376	162156	177070	208200
Crane rate	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3	24.5	22.4	23.6	23.5	23.6
Elapsed rate	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0	26.5	22.1	24.3	25.1	26.0
Net rate	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.7	32.2	27.2	28.7	29.7	29.9
Adelaide																	
Ships handled	21	26	28	34	31	33	35	50	34	42	47	63	70	74	69	65	68
Total teus	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	23351	21963	20933	25982
Crane rate	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	24.0	24.6	26.0	26.1
Elapsed rate	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	27.7	30.2	35.1	35.2
Net rate	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	28.3	30.9	36.0	36.2
Fremantle																	
Ships handled	116	115	127	135	121	124	128	136	139	124	143	153	159	161	159	164	166
Total teus	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	47597	51113	50791	55593	51784	52092	57903
Crane rate	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4	20.8	21.5	23.3	22.9	23.1
Elapsed rate	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.3	17.6	16.0	18.6	19.7	19.5	21.0
Net rate	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5	22.6	24.2	25.0	24.0	25.5
Five ports																	
Ships handled	683	796	655	814	782	809	782	739	721	728	748	827	871	907	865	891	907
Total teus	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	411538	440098	497140	519206	441697	483372	549247
Crane rate	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.3	22.3	21.2	22.8[r]	22.8	23.2
Elapsed rate	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6	23.6	na	23.1	23.8	26.0
Net rate	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	27.1	28.5	29.1	27.2	29.0[r]	29.5	31.0

na not available

r Revised to incorporate amended data provided by a Sydney terminal operator which has updated its information systems.

Notes 1. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992 (see earlier issues of Waterline), and are excluded from the measure of time in later quarters. This means that rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

3. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
BTCE	Bureau of Transport and Communications Economics
teu	Twenty-foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

ACKNOWLEDGMENTS

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WATERLINE

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BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS

IN BRIEF

Stevedoring productivity

Overall productivity at the major Australian container terminals did not change significantly in the December quarter 1997. The five-port average *crane rate* was 18.5 containers per hour, compared with 18.3 in the September quarter 1997. The five-port average *elapsed rate* was 20.5 containers per hour in the December quarter 1997, compared with 20.4 in the September quarter 1997. The five-port average *net rate* was 24.3 containers per hour in the December quarter 1997, unchanged from the previous period.

page two

Waterfront reliability

Berth availability within four hours of the scheduled time declined to 84 per cent in the December quarter 1997, from 89 per cent in the September quarter 1997. Availability of pilots and tugs within one hour of the confirmed time was 100 per cent, similar to performance in the previous quarter.

The proportion of ship calls affected by other waiting time incidents remained around 40 per cent in the December quarter. At least 60 per cent of these incidents directly involved waterfront services.

page three

Port Interface Cost Index

In the July to December 1997 period, port interface costs for international containers declined by almost 1 per cent for both imports and exports, compared with the January to June 1997 period. In real terms, this represents a decrease of just over 1 per cent.

page seven

Port performance - financial

Return on assets (EBIT as a proportion of average total assets) increased in 1996/97 for the Port of Brisbane Corporation (16 per cent) and Fremantle Port Authority (2 per cent). The return on assets decreased for the Sydney Ports Corporation (2 per cent) in 1996/97.

The *dividend payout ratio* (dividends paid out as a proportion of operating profit) fell for the Port of Brisbane Corporation (6 per cent) and rose by 8 per cent for the Sydney Ports Corporation in 1996/97.

The *debt/equity ratio* for the Port of Brisbane Corporation remained unchanged in 1996/97. The debt/equity ratio for the Sydney Ports Corporation decreased by 6 per cent in 1996/97. A decrease in total debt and an increase in total equity resulted in a 34 per cent reduction in the debt to equity ratio for Ports Corp South Australia.

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Port performance - non-financial

Total cargo throughput at the five ports fell in the July to December 1997 period to 43.6 million tonnes, compared with 45.4 million tonnes in the January to June 1997 period.

The tonnage of *non-containerised general cargo* handled at the five ports increased by 12.6 per cent in the July to December 1997 period to 2.5 million tonnes, compared with 2.2 million tonnes in the January to June 1997 period.

Measured in teus, *container traffic* for the five ports increased by 15.6 per cent in the July to December 1997 period to 1.3 million teus, compared with 1.1 million teus in the January to June 1997 period. However, the throughput of loaded teus increased by only 14.3 per cent, with loaded imports increasing 18.8 per cent and loaded exports increasing 9.2 per cent.

Average total employment at the five mainland capital city port authorities/corporations fell by 10.6 per cent in the July to December 1997 period. This follows a 5.1 per cent fall between July–December 1996 and January–June 1997, and represents a 15.2 per cent fall in average total employment over the past year.

page twelve

Crew to berth ratios

The *crew to berth ratio* for merchant shipping was 2.123 in the December quarter 1997 (preliminary), compared with 2.152 in the September quarter 1997, and below the initial level of 2.133 in the September quarter 1993.

The crew to berth ratio for offshore shipping was 2.334 in the December quarter (preliminary), compared with 2.366 in the September quarter.

page fourteen

Single voyage permits

This issue of *Waterline* reports for the first time data on single voyage permits.

page seventeen

STEVEDORING PRODUCTIVITY

Table 1 presents the December quarter 1997 indicators of stevedoring productivity for the major Australian container terminals, expressed in container moves per hour. The data for Brisbane, Sydney, Melbourne and Fremantle are averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the SeaLand terminal.

Overall national stevedoring productivity, as measured by the five-port average, did not change significantly in the December quarter 1997:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 18.5 containers per hour, compared with 18.3 in the September quarter 1997;
- the five-port average *elapsed rate* (productivity *per ship* based on the time labour is aboard the ship) was 20.5 containers per hour, compared with 20.4 in the September quarter 1997; and
- the five-port average *net rate* (productivity *per ship* while the ship is worked) was 24.3 containers per hour in the December quarter 1997, unchanged from the previous period.

In Brisbane the crane rate was 16.8 containers per hour in the December quarter, an increase of 0.7 containers per hour on the previous period. The higher crane rate resulted in a 2.6 per cent increase in the net rate to 19.6 containers per hour.

In Sydney the December quarter crane rate was 18.4 containers per hour compared with 18.2 containers per hour in the September quarter. There were no significant changes in the elapsed and net rates.

In Melbourne the crane rate was 18.8 containers per hour in the December quarter, compared with 18.6 containers per hour in the previous period. This marginal increase was in contrast to decreases in the elapsed rate (19.9 containers per hour, down from 20.5 containers per hour) and the net rate (22.6 containers per hour, down from 23.5 containers per hour).

In Adelaide the crane rate was 21.4 containers per hour in the December quarter, compared with 21.1 containers per hour in the previous period. This minor increase represents a continuation in the gradual improvement in Adelaide stevedoring productivity. The slight increase in crane productivity contributed to increases in the elapsed rate (29.2 containers per hour, compared with 28.4) and the net rate (30.1 containers per hour, an increase of almost one container per hour over the previous period).

In Fremantle the crane rate was 18.9 containers per hour in the December quarter. Although this represents a change of only 0.1 containers per hour, a significant increase in average crane intensity resulted in large increases in the elapsed rate (18.9 containers per hour, up by 1.9 containers per hour) and the net rate (23.2 containers per hour, up from 20.6 containers per hour).

Teus per hour

Figures 1 to 6 and table 14 present the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purposes of long term historical comparison and are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20 foot and 40 foot containers over time. Nevertheless, in the December quarter, the teu based and container based data generally reflect similar movements in productivity.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS— CONTAINERS PER HOUR

Port/ indicator	Quarter								
	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97
Brisbane									
Crane rate	15.8	17.6	16.7	16.5	16.9	17.3	16.4	16.1	16.8
Elapsed rate	17.0	19.0	17.2	17.2	17.4	17.3	16.6	16.8	16.8
Net rate	20.6	21.5	20.4	20.4	20.4	19.4	18.7	19.1	19.6
Sydney									
Crane rate	15.0	15.6	16.0	16.1	15.4	17.7	17.7	18.2	18.4
Elapsed rate	17.6	18.9	17.6	18.2	na	18.2	18.5	21.7	21.9
Net rate	21.0	22.1	22.4	23.3	22.7	25.7	25.5	27.9	27.6
Melbourne									
Crane rate	16.3	17.0	18.4	19.6	17.8	19.0	19.0	18.6	18.8
Elapsed rate	18.8	20.2	20.5	21.1	17.9	19.5	20.3	20.5	19.9
Net rate	21.9	23.4	25.9	25.6	21.7	23.0	24.0	23.5	22.6
Adelaide									
Crane rate	18.8	18.9	18.2	19.3	19.6	19.6	21.0	21.1	21.4
Elapsed rate	22.8	23.3	22.0	22.2	22.6	24.0	28.3	28.4	29.2
Net rate	23.3	23.8	22.5	22.8	23.1	24.6	29.1	29.2	30.1
Fremantle									
Crane rate	16.2	17.9	20.0	17.8	18.2	19.4	19.0	18.8	18.9
Elapsed rate	13.4	15.7	14.8	13.4	15.6	16.2	15.9	17.0	18.9
Net rate	16.7	18.9	20.0	19.4	20.5	20.6	19.8	20.6	23.2
Five ports									
Crane rate	15.9	16.9	17.7	18.0	17.1	18.4	18.3	18.3	18.5
Elapsed rate	17.7	19.3	18.6	19.0	na	18.6	19.0	20.4	20.5
Net rate	20.9	22.3	23.4	23.5	21.8	23.4	23.6	24.3	24.3

na not available

Notes 1. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

2. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 14.

Sources Patrick, P&O Ports and SeaLand.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability and predictability of waterfront performance for container traffic at major Australian ports.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the December quarter 1997. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

The sample for the December quarter covers 292 ship calls, equivalent to 30 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 23 per cent at Brisbane to 42 per cent at Adelaide.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ships was 84 per cent in the December quarter, down from 89 per cent in the September quarter. The major change over this period was a significant decline in berth availability at Melbourne.

Caution should be used in undertaking inter-port comparisons of berth availability as there is some variation between ports in sample sizes and ship call patterns. However, the data in table 2 suggest that berth availability at Sydney and Melbourne (around 80 per cent) was significantly lower than berth availability at the other three ports (around 90 per cent) in the December quarter.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. In the December quarter, the pilotage and towage indicators were 100 per cent. This was similar to performance in the previous quarter.

Other waiting time

The 10 shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments (instances where the shipping line regularly holds the ship off the port or at the berth in order to maintain the fixed-day schedule).

In the December quarter 1997, 119 ship calls were affected by other waiting time incidents that had a duration of at least 1 hour. These calls comprised 41 per cent of all ship calls in the sample, similar to the overall figures in the June and September quarters. The proportion at individual ports generally ranged between 30 per cent and 40 per cent in the December quarter. However, 56 per cent of ship calls in the sample for Melbourne were affected by other waiting time.

Table 3 summarises the data on other ship waiting time incidents. The shipping lines identified a total of 159 incidents for the sample of ship calls in the December quarter. The average waiting time associated with each incident was 8 hours, up from 6 hours in the previous quarter. One-quarter of the ship calls that incurred other waiting time were affected by two or more incidents.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, DECEMBER QUARTER 1997

(Number of ship calls)

	Delay (hrs)								Total no. of ship calls
Port/operation	0	1	2	3	4	5–10	11–20	>20	
Brisbane									
Berth availability	**36**	**1**	**0**	**0**	**0**	2	1	0	40
Pilotage	**40**	**0**	0	0	0	0	0	0	40
Towage	**40**	**0**	0	0	0	0	0	0	40
Sydney									
Berth availability	**57**	**0**	**0**	**1**	**0**	9	6	1	74
Pilotage	**74**	**0**	0	0	0	0	0	0	74
Towage	**74**	**0**	0	0	0	0	0	0	74
Melbourne									
Berth availability	**64**	**0**	**1**	**0**	**2**	10	3	4	84
Pilotage	**84**	**0**	0	0	0	0	0	0	84
Towage	**84**	**0**	0	0	0	0	0	0	84
Adelaide									
Berth availability	**25**	**1**	**0**	**0**	**0**	0	1	1	28
Pilotage	**28**	**0**	0	0	0	0	0	0	28
Towage	**28**	**0**	0	0	0	0	0	0	28
Fremantle									
Berth availability	**56**	**1**	**0**	**1**	**0**	4	4	0	66
Pilotage	**66**	**0**	0	0	0	0	0	0	66
Towage	**66**	**0**	0	0	0	0	0	0	66
Five ports									
Berth availability	**238**	**3**	**1**	**2**	**2**	25	15	6	292
Pilotage	**292**	**0**	0	0	0	0	0	0	292
Towage	**292**	**0**	0	0	0	0	0	0	292

Note *Data for individual ports should be interpreted with caution as there may be significant inter-port variation in factors such as the proportion of ship calls that involve fixed-day sailings.*

Source *Data for a sample of ship calls provided by shipping lines.*

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE—TEUS PER HOUR

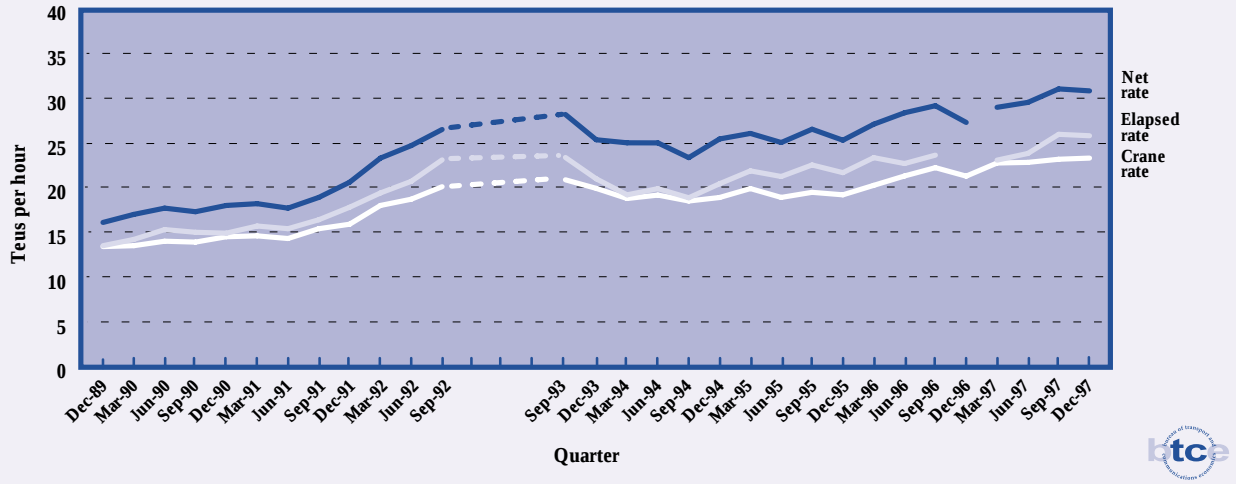


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR

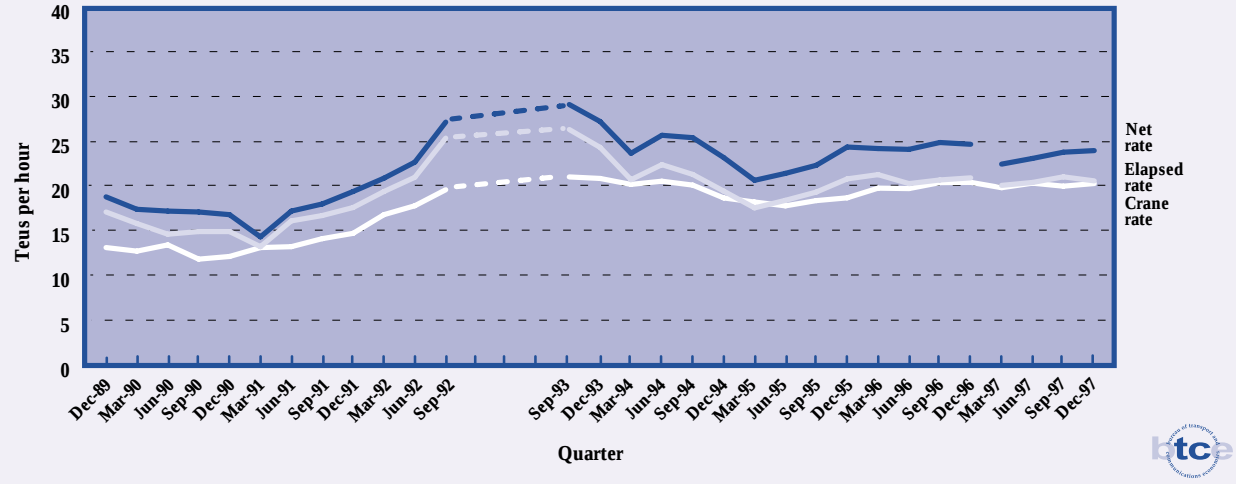
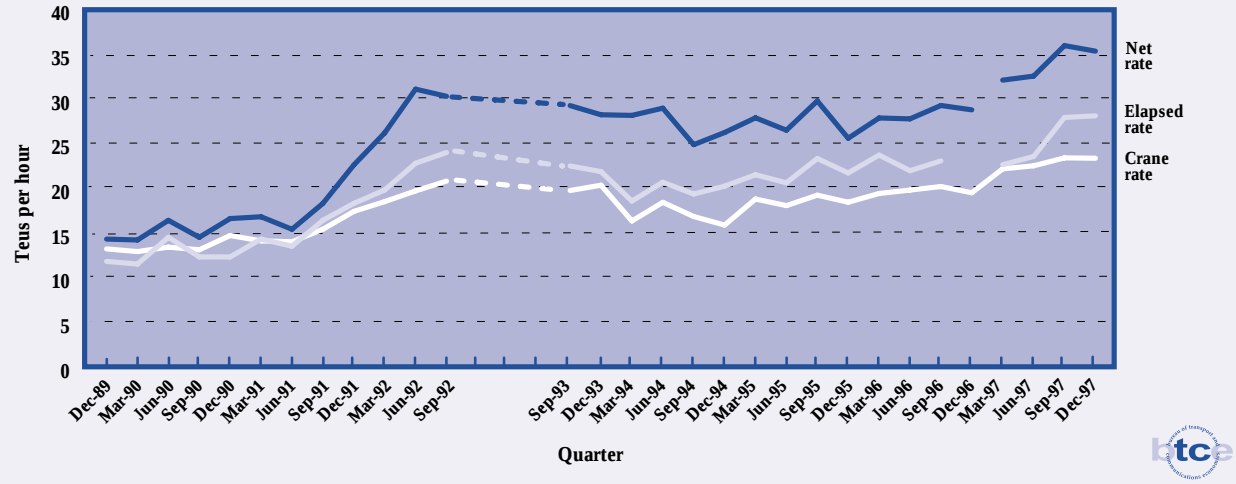


FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR



Notes *Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and are excluded from the measure of time in later quarters. Data are unavailable for the December quarter 1992 to the June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR

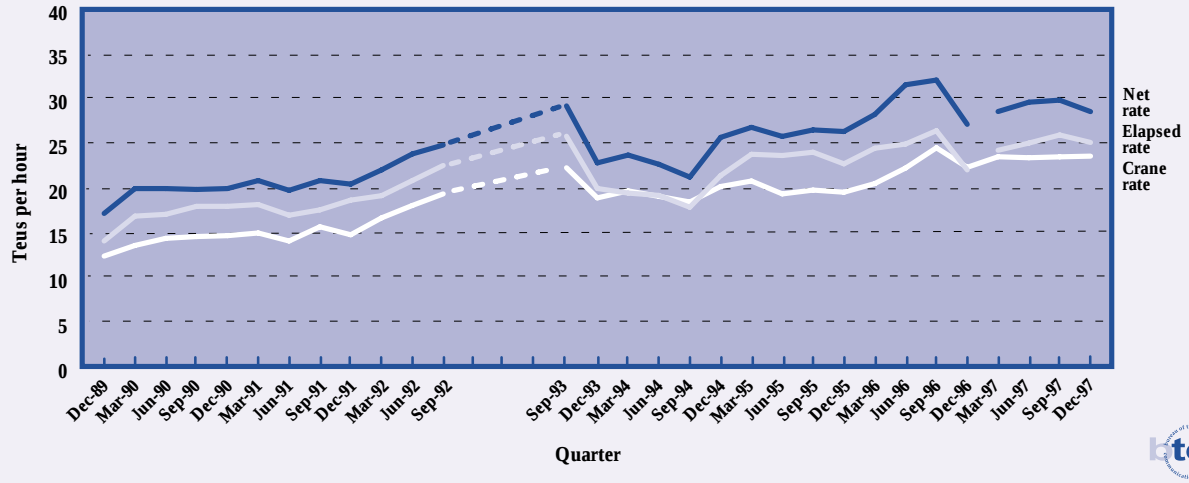


FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE—TEUS PER HOUR

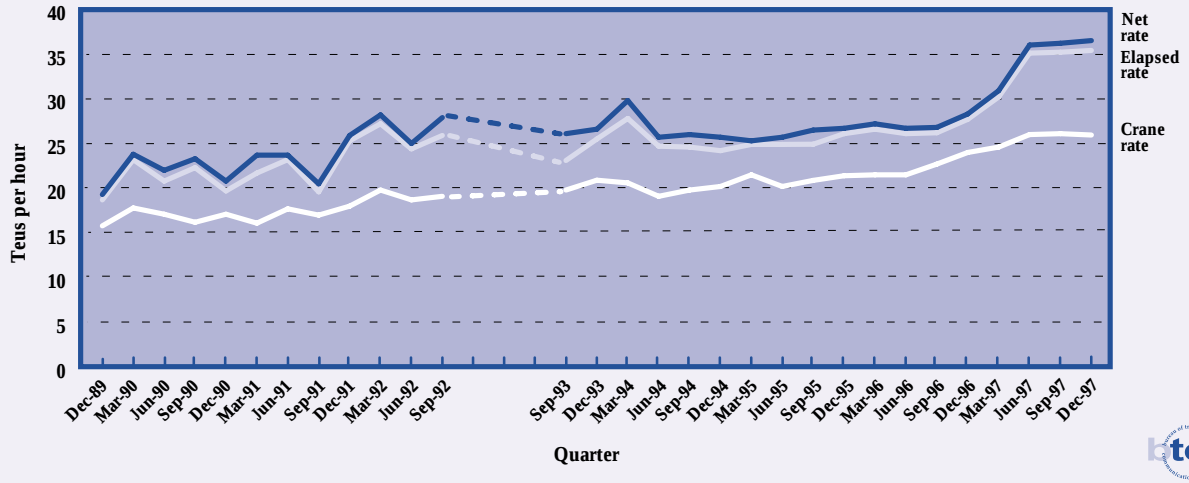
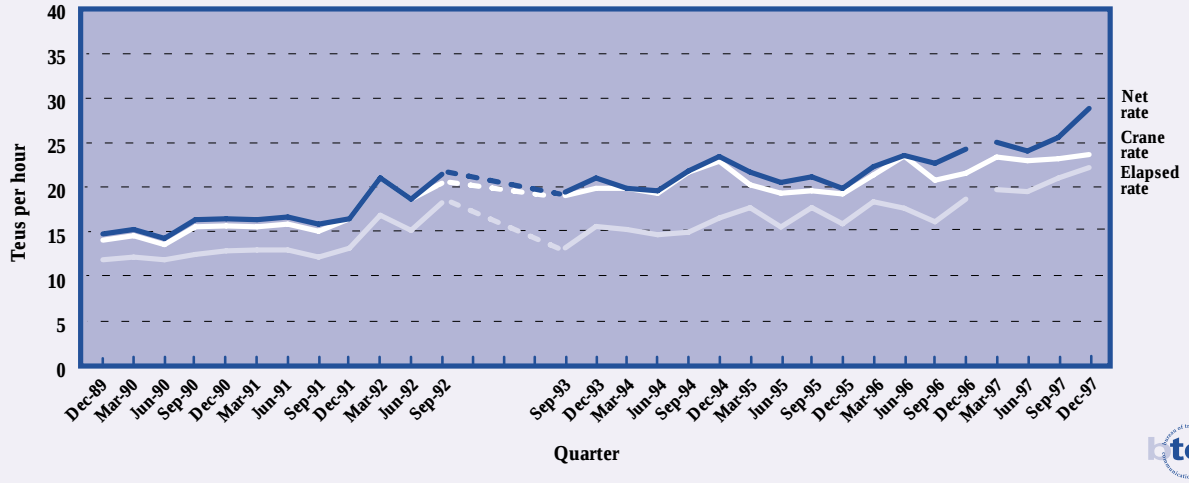


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE—TEUS PER HOUR



Notes *Elapsed rates and net rates from the March quarter 1997 are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems. Award shift breaks are included in the measure of time used to calculate net rates and crane rates to the end of the September quarter 1992, and are excluded from the measure of time in later quarters. Data are unavailable for the December quarter 1992 to the June quarter 1993.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, DECEMBER QUARTER 1997

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5–10	11–20	>20	Total no. of incidents
Ship arrived early	1	6	2	3	7	1	2	22
Awaiting labour	0	2	0	6	9	4	1	22
Stevedoring finished early	5	8	4	2	2	0	0	21
Stevedoring finished late	2	2	1	1	6	7	0	19
Crane breakdown	5	1	1	1	2	2	0	12
Industrial action	0	1	0	0	4	3	2	10
Pilot/tug booking not at preferred time	2	4	1	1	1	0	0	9
Ship repairs or maintenance	0	0	2	1	1	4	0	8
Weather or tides	1	2	1	1	2	1	0	8
Closed port—holidays	0	0	0	0	0	1	7	8
Awaiting cargo	1	0	0	2	2	1	0	6
Other[a]	2	3	1	2	5	0	1	14
Total incidents	**19**	**29**	**13**	**20**	**41**	**24**	**13**	**159[b]**

a. For example, ship arrived late, ship moved to another berth or terminal, ship departure delayed due to congestion at the next port of call, faulty lashing gear or stowaways.

b. These incidents affected 119 of the 292 ship calls covered in table 2.

Source Data for a sample of ship calls provided by shipping lines.

Some of the waiting time incidents reported in table 3 resulted from a combination of ship-related and waterfront factors. However, at least 60 per cent of the incidents (47 per cent of waiting time) in the December quarter directly involved waterfront services (mainly items 2 to 7 in table 3). Another 21 per cent of incidents (24 per cent of waiting time) directly involved ship operations (mainly early ship arrival and repairs/maintenance). Some other incidents, particularly awaiting cargo and closed port (holidays), might also be associated with specific sectors.

Improved operating practices would reduce ship waiting time at Australian ports. However, a certain level of waiting time is unavoidable due to inherent factors such as bad weather. In addition, some of the ship waiting time reported in table 3 reflects conscious decisions by the industry to avoid the high capital costs (and waterfront charges) that would be required to provide services at the preferred times for all ship calls. For example, several shipping lines commented that the unavailability of tug bookings at the preferred times for a small number of ship calls reflected a reasonable trade-off between towage charges (price) and service availability (quality).

Stevedoring

Table 4 presents the available information on three aspects of stevedoring reliability at the major container terminals — stevedoring completion, stevedoring rate and cargo receival. December quarter data are not available for Fremantle due to upgrading work on one terminal operator's information system.

Stevedoring completion provides a partial indicator of the accuracy with which stevedoring time is predicted. It is defined as the proportion of ship visits where stevedoring completion time is within one hour (plus or minus) of the time initially agreed when the overall work program for the ship is prepared. The Brisbane and Sydney data indicate that there was significant inter-port variation in stevedoring completion in the December quarter.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The stevedoring rate indicator ranged from 49 per cent to 60 per cent at the three ports for which data are available in the

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, SEPTEMBER AND DECEMBER QUARTERS 1997

(per cent)

Indicator	Brisbane Jul–Sep	Brisbane Oct–Dec	Sydney Jul–Sep	Sydney Oct–Dec	Melbourne Jul–Sep	Melbourne Oct–Dec	Adelaide Jul–Sep	Adelaide Oct–Dec	Fremantle Jul–Sep	Fremantle Oct–Dec
Stevedoring										
Stevedoring completion	na	58	24	27	na	na	na	na	na	na
Stevodoring rate	61	49	62	60	62	59	na	na	na	na
Cargo receival	93	93	93	85	94	97	na	na	na	na
Ship arrival										
Advice at 24 hrs	63	na	53	60	na	na	80	91	58	53
Advice inside 24 hrs	53	na	92	94	na	na	na	na	81	81

na not available.

Sources AAPMA, Patrick and P&O Ports.

December quarter. Factors which potentially affect the stevedoring rate indicator include the mix of ships handled at each port, typical cargo stowage patterns on the ships and operating practices at the terminals.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container terminal performance. In the December quarter the cargo receival indicator ranged between 85 per cent and 97 per cent at the three ports for which data are available.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice. The accuracy of this advice potentially affects the ability of waterfront operators to provide services at the times required by shipping lines. It may vary between ports for a number of reasons, such as differences in weather conditions and the order in which individual ports are served.

The first indicator of ship arrival advice is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority / corporation *at 24 hours prior to actual arrival*. The proportion at the three ports for which data are available ranged between 53 per cent and 91 per cent in the December quarter. Updated Brisbane data will be available for the next issue of *Waterline*.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. Figures of 81 per cent and 94 per cent were reported at Fremantle and Sydney respectively in the December quarter. It is expected that Adelaide data will be available for the next issue of *Waterline*.

Concluding comments

The major change in the reliability indicators in the December quarter was the decline in berth availability to 84 per cent. There was little change in the availability of pilots and tugs at the confirmed time or in the overall proportion of ship calls affected by other waiting time. The available data on stevedoring reliability and ship arrival advice suggest continued variability in performance in these areas.

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs (charges) for containers moved through the Australian mainland capital city ports. Information for the period to July–December 1997 is presented in tables 5 to 7, and figure 7.

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. The indicative approach was adopted because of the difficulty of obtaining data on the multitude of factors affecting the prices charged by each service provider, particularly for towage and road transport charges, and customs brokers' fees.

Port and related charges

Table 5 provides the cost parameters used to determine the port and related charges in table 6. These cost parameters relate to a representative port call by a containership (Lloyd's ship classification UCC). The representative ship is selected from the ship size range that

TABLE 5 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1997

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec[p]
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
Teus exchanged[a]										
Total	346	402	713	818	697	724	207	239	330	361
Loaded	267	308	597	680	596	607	172	187	276	298
Empty	79	94	116	138	101	117	35	52	54	63
Loaded inwards	111	139	364	419	305	324	63	74	140	160
Loaded outwards	156	169	233	261	291	283	109	113	136	138
Primary produce	-	-	-	-	-	-	41	-	-	-
Ship call parameters[a]										
Number of port calls	3	4	4	3	3	3	4	4	7	6
Elapsed berth time (hrs)	23.3	24.3	38.6	38.6	34.5	36.2	15.0	11.3	18.1	18.1

- not required

p Provisional. Fremantle Port Authority port call data were not available at time of publication. Total teus exchanged and the number of port calls made are based on preliminary calculations by Fremantle Port Authority.

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

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

TABLE 6 PORT AND RELATED CHARGES, 1997

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec
Ship-based charges ($/teu)										
Conservancy	6.46	5.56	-	-	-	-	7.27	5.03	1.60	1.46[p]
Tonnage	-	-	9.90	8.63	9.88	8.44	17.99	14.41	7.68	7.01[p]
Pilotage	14.81	12.75	4.77	4.16	7.87	7.57	11.37	9.83	6.68	5.79[p]
Towage	29.21	25.15	13.70	11.95	10.55	10.15	59.50	51.47	33.14	27.26[p]
Mooring & unmooring	4.82	4.15	4.41	3.85	3.19	1.38	-	-	3.34	3.05[p]
Berth hire[a]	-	-	-	-	11.87	11.95	-	-	-	-
Total[b]	55.30	47.61	32.78	28.59	43.37	39.49	96.13	80.75	52.43	44.56[p]
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	37.40	34.30	65.00	53.00	49.79	47.30
Exports	26.00	26.00	45.00	45.00	37.40	34.30	61.20	53.00	49.79	47.30
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	14.63	13.90
Total port and related charges ($/teu)[b]										
Loaded imports	123.30	115.61	92.78	88.59	80.77	73.79	161.13	133.75	116.85	105.76[p]
Loaded exports	123.30	115.61	77.78	73.59	80.77	73.79	157.34	133.75	116.85	105.76[p]
Charges per ship visit ($/visit)										
Total ship-based charges	19157	19157	23380	23380	30211	28599	19873	19296	17278	16088
Empty teus[c]	1126	1340	1160	1380	1099	1168	0	0	437	485

- not applicable
p Provisional. See table 5 notes for details.
a. Charged by stevedores and itemised separately from basic stevedoring charge.
b. Components may not sum to totals due to rounding.
c. 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 5.

Sources BTCE 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.

had the most port calls from UCC type ships during the particular period. The other cost parameters are then determined by taking the mean of all port calls in the range that contains the representative ship. Typically, the ship size range of 15 001 to 20 000 GRT has had the most calls at each port.

It is important to consider the relationship between the mean number of teus exchanged per port call and the size of the representative ship. This is because most port and related charges, particularly towage and port authority tonnage charges, are dependent on the size of the ship. However, shipping economics are such that most ship operators will attempt to exchange larger amounts of cargo, per port call, the larger the ship being used to transport the cargo. As a result, the per unit charge may remain the same. It is for this reason that comparative port charge analyses that keep the cargo exchange constant while varying the ship size are misleading. A discussion of this, in relation to the Port Interface Cost Index, can be found in *Waterline* 4, pp. 9–13. That article also demonstrates that the BTCE's Port Interface Cost Index is a reasonable approximation of port interface costs for most container movements across the Australian mainland capital city ports.

Table 6 provides the port and related charges at the five mainland capital city ports for the periods January to June 1997 and July to December 1997. Port and related charges comprise ship-based charges and cargo-based charges.

Ship-based charges

On a per teu basis, total ship-based port and related charges fell at all five ports in the July to December 1997 period, due to an increase in the mean number of teus exchanged per port call for all ports. However, only at the ports of Melbourne and Fremantle were there actually any changes in the ship-based charge rates. Based on the representative ship, these changes in port and related charges for the July to December 1997 period were:

- a 5 per cent decrease in pilotage charges and a 10 per cent reduction in towage charges in Fremantle; and

- an 11 per cent reduction in tonnage charges and a 55 per cent decrease in mooring and unmooring charges in Melbourne.

The large decrease in mooring and unmooring charges in Melbourne is due to a 13 per cent reduction in charges in addition to changes in operating procedures. For ships less than 200 m in length, a launch is no longer required to be hired for mooring and unmooring operations, resulting in a direct saving to ship operators of $1070 per visit.

On a per ship visit basis, there were no changes in total ship-based charges at the ports of Brisbane and Sydney.

In Fremantle, the reductions in pilotage and towage charges resulted in a decrease of 6.9 per cent in total ship-based charges per ship visit.

In Melbourne, the cost of berth hire is based on the elapsed berth time, which increased by 5 per cent (on average). Consequently, the net effect of an increase in the cost of berth hire and the decreases in tonnage and mooring charges was a 5 per cent decrease in total ship-based charges per ship visit.

In Adelaide, tonnage costs depend on the time the ship stays at the berth, measured as elapsed berth time. The elapsed berth time decreased by 25 per cent, on average, in the July to December 1997 period, and this resulted in a 3 per cent reduction in total ship-based charges per ship visit.

While caution should always be taken when making port comparisons, on a per teu basis, Sydney remains the lowest cost port for ship-based charges. This is significant from the cargo owners' point of view. However, Sydney maintains this position as a direct result of the substantially larger number of teus exchanged per port call. From the point of view of ship operators using ships similar to the representative ship in table 5, Fremantle remains the lowest cost port for ship-based charges on a per ship visit basis.

Cargo-based charges

There were no changes in port and related cargo-based charges at the ports of Brisbane or Sydney in the July to December 1997 period. Changes in port and related cargo-based charges at the other three ports were:

- an 8 per cent decrease in wharfage charges at Melbourne;
- an 18 per cent and a 13 per cent decrease in wharfage charges for loaded import and export containers, respectively, at Adelaide; and
- a 5 per cent decrease in both wharfage charges and berth charges at Fremantle.

Changes in total port and related charges

In Brisbane, on a per teu basis, total port and related charges fell 6 per cent for loaded import and loaded export containers in the July to December 1997 period, compared with the previous period. As there were no changes in any actual port and related charges at Brisbane during this period, this decrease demonstrates the impact a 16 per cent increase in the mean teu exchange can have on the per unit charge.

In Sydney, on a per teu basis, total port and related charges fell 5 per cent for loaded import and loaded export containers in the July to December 1997 period, compared with the previous period. Like Brisbane, this decrease was the direct result of an increase (15 per cent) in the mean teu exchange per port call, rather than as a result of any changes in actual charges.

In Melbourne, on a per teu basis, total port and related charges fell 9 per cent for loaded import and loaded export containers in the July to December 1997 period compared with the previous period. This decrease was the result of an increase in the mean teu exchange and a net decrease in ship based charges.

In Adelaide, on a per teu basis, total port and related charges fell 17 per cent for loaded import containers and 15 per cent for loaded export containers in the July to December 1997 period, compared with the previous period. These reductions were mainly the result of changes in wharfage charges. Since wharfage is a cargo-based charge, it is a significant component of per teu port and related charges. While the reduction in Adelaide's total port and related charges represents the largest decrease of all five ports, Adelaide remains the most expensive port for total port and related charges on a per teu basis.

In Fremantle, there have been reductions in port and related charges in the July to December 1997 period, but since the actual cost parameters used in table 5 are provisional, no comment can be made regarding the impact on total port and related charges on a per teu basis. Nevertheless, it is believed that the provisional data provide a reasonable approximation of the situation in Fremantle.

Stevedoring charges per teu

The last ACCC survey of container terminal operations provided a provisional estimate of stevedoring charges of $203 per teu in 1995. For the January to June 1997 period, the BTCE contacted a range of shipping lines and terminal operators as an interim attempt to obtain more recent estimates for container stevedoring charges.

As a result, it was estimated that average revenue for container stevedoring was 7.5 per cent, or $15 per teu, less than the ACCC's provisional 1995 estimate. This led to a provisional stevedoring charge of $188 being used for the January to June 1997 Port Interface Cost Index.

The BTCE is currently working to obtain detailed data to provide a more robust estimate of stevedoring charges. In the meantime, the provisional estimate of $188 used for the January to June 1997 Port Interface Cost Index has also been used as the provisional estimate for the July to December 1997 period.

Land-based charges per teu

The average customs brokers' fees and road transport charges for the January to June 1997 and July to December 1997 Port Interface Cost Index are included in table 7. These charges are based on data provided by approximately 40 customs brokers and 50 road transport operators.

In the July to December 1997 period there was little movement in customs brokers' fees, with the only changes being an increase (2 per cent) in the fee for imports at Brisbane and a decrease (4 per cent) in the fee for exports in Fremantle.

Customs brokers' fees for import containers are significantly higher than the fees for export containers. This reflects the more complex clearance procedures for import containers.

There was also little movement in road transport charges in the July to December 1997 period, with increases at Brisbane (2 per cent) and Fremantle (1 per cent). The $1 increase at Melbourne is not regarded as significant.

One of the parameters used to estimate road transport charges is the time taken to move containers from (to) the wharf to (from) the customer's warehouse. Traffic congestion impacts on this parameter and helps explain to some extent the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

Indices for individual ports

Table 7 indicates that port interface costs declined at all Australian mainland capital city ports between January–June 1997 and July–December 1997. The greatest reduction in port interface costs occurred at Adelaide, with a 4 per cent decrease in both the import and export indices. At Fremantle, port interface costs fell by 2 per cent for both the import and export indices. In Melbourne port interface costs fell by 1 per cent. At Brisbane and Sydney, both the import and export indices fell by less than 1 per cent.

However, the reductions in the port interface cost indices should be interpreted with great care given the provisional nature of the reported stevedoring charges. If stevedoring charges were to have increased by only 5 per cent in the July to December 1997 period, four of the five ports would have recorded an increase in port interface costs.

TABLE 7 PORT INTERFACE COSTS, 1997

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec
Imports										
Ship-based charges	55	48	33	29	43	39	96	81	52	45[p]
Cargo-based charges	68	68	60	60	37	34	65	53	64	61
Stevedoring[p2]	188	188	188	188	188	188	188	188	188	188
Customs brokers' fees	121	123	154	154	138	138	131	131	145	145
Road transport charges	176	179	288	288	251	252	157	157	192	194
Total imports[a]	609	606	722	718	658	651	638	610	642	632
Exports										
Ship-based charges	55	48	33	29	43	39	96	81	52	45[p]
Cargo-based charges	68	68	45	45	37	34	61	53	64	61
Stevedoring[p2]	188	188	188	188	188	188	188	188	188	188
Customs brokers' fees	78	78	110	110	89	89	71	71	73	70
Road transport charges	176	179	288	288	251	252	157	157	192	194
Total exports[a]	566	561	663	659	609	602	574	551	569	558

p Provisional. See table 5 notes for details.

p2 Provisional pending updating of stevedoring charge using detailed survey data.

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

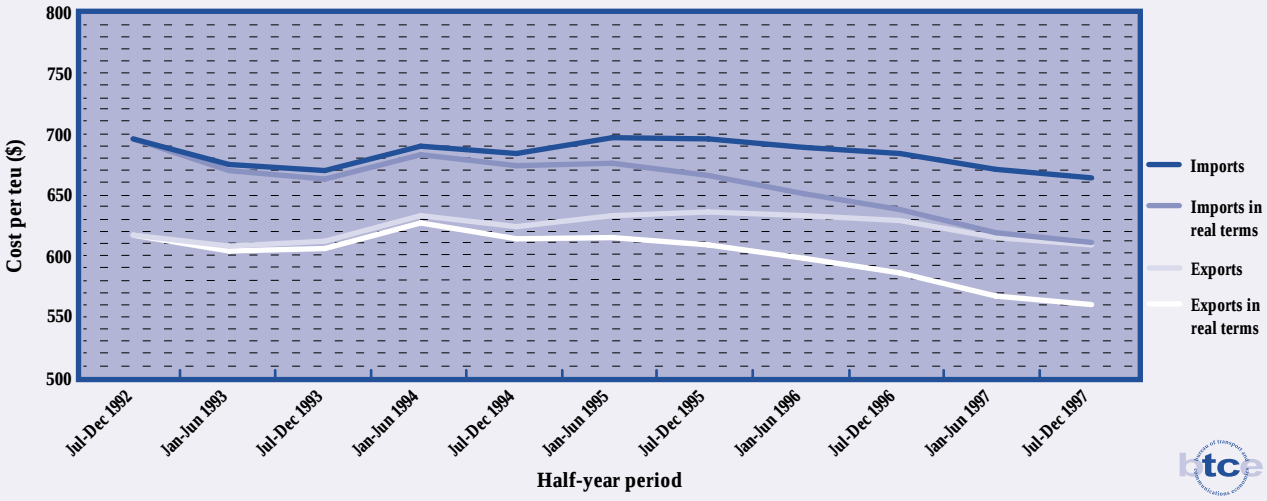
Notes 1. Based on parameters described in table 5.

2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.

3. The stevedoring charge used in Waterline is a weighted average for several major Australian ports. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTCE 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; and stevedoring charges data supplied by the ACCC and industry sources.

FIGURE 7 NATIONAL PORT INTERFACE COST INDEX



Sources *BTCE 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 gross non-farm product deflator data (cat. no. 5206.0).*

Even if stevedoring charges did not change during the July to December 1997 period, care should also be taken in making inter-port comparisons of port interface costs. For example, the use of a single stevedoring charge for all ports reflects the scope of the available information, which is not disaggregated on an individual port basis. In practice, container stevedoring charges often vary between ports.

National index

Figure 7 provides the national Port Interface Cost Index since it was first produced for the July to December 1992 period. The figure also shows the Port Interface Cost Index in real terms.

In overall terms, the index declined by approximately 1 per cent for both imports and exports in the July to December 1997 period. In real terms, this represents a decrease of just over 1 per cent.

Since the Port Interface Cost Index was developed, national port interface costs have fallen by approximately 12 per cent for imports and 9 per cent for exports, in real terms.

PORT PERFORMANCE - FINANCIAL

Information on the financial performance of the five mainland capital city port authorities/corporations in 1995/96 and 1996/97 is presented in table 8.

Financial data for Melbourne were not available for the 1995/96 period, as the Port of Melbourne Authority was replaced by three entities from 1 March 1996. As a consequence, the 1996/97 data in table 8 for Melbourne represent the Melbourne Port Corporation's (MPC) financial performance for the period 1 March 1996 to 30 June 1997 (16 months) as published in the MPC's 1997 Annual Report.

Earnings and assets

Earnings before interest and tax (EBIT) increased in 1996/97 for the Brisbane and Sydney port corporations (24 and 4 per cent, respectively), and for the Fremantle Port Authority (9 per cent). Given that Ports Corp South Australia's 1995/96 EBIT figure was affected by abnormal items associated with the restructuring process, no substantive comment can be made on changes in this figure in 1996/97.

Operating profit after income tax in 1996/97 increased by 33 per cent for the Port of Brisbane Corporation, and fell by 11 per cent for the Sydney Ports Corporation and 40 per cent for the Fremantle Port Authority.

Average total assets in service rose for the Brisbane (6 per cent), Sydney (7 per cent) and Fremantle (7 per cent) port authorities/corporations in 1996/97. The decline of 13 per cent for Ports Corp South Australia is largely the result of the write-down of asset values in the 1995/96 period.

Return on assets (EBIT as a proportion of total assets) increased in 1996/97 for the Port of Brisbane Corporation (16 per cent) and the Fremantle Port Authority (2 per cent). The return on assets decreased for the Sydney Ports Corporation (2 per cent) in 1996/97.

Dividends

Dividends paid in 1996/97 by the Port of Brisbane Corporation and Ports Corp South Australia increased by 26 per cent and 18 per cent respectively. The

TABLE 8 FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORT AUTHORITIES/CORPORATIONS, 1995/96 & 1996/97

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	1995/96	1996/97	1995/96	1996/97	1995/96	1996/97[f]	1995/96	1996/97	1995/96	1996/97
Indicator				*per cent*						
Return on assets[a]	5.8	6.7	15.8	15.5	e	12.7	–23.6[g]	19.6	14.6	14.9
Dividend payout ratio[b]	38.8	36.3	56.5	61.3	e	27.4	–7.8[g]	64.6	0.0	0.0
Debt/equity[c]	0.1	0.1	109.3	102.9	e	33.6	133.0	87.6	1490.2	109.2
				$ million						
EBIT[d]	22.6	28.1	49.8	52.0	e	59.6	–32.0[g]	23.1	14.5	15.8
Average total assets in service	390.5	415.7	314.5	335.4	e	469.8	135.2	117.6	99.1	106.1
Dividends paid	5.8	7.3	15.1	14.6	e	7.4	3.4	4.0	0.0	0.0
Operating profit[d]	15.0	20.0	26.8	23.8	e	27.1	–43.3[g]	6.1	8.3	5.0
Total debt	0.4	0.4	150.0	150.6	e	114.4	65.5	45.0	54.5	44.2
Total equity	375.6	399.4	137.2	146.4	e	340.3	49.2	51.4	3.7	40.5

a. EBIT as a proportion of average total assets. EBIT is earnings before interest and tax.

b. Dividends paid out as a proportion of operating profit.

c. Total debt as a proportion of total equity.

d. Includes abnormals.

e. The Melbourne Port Corporation commenced operation on 1 March 1996 as port landlord, being one of three entities taking over the functions of the former Port of Melbourne Authority. Thus consistent financial data are not available for the 12 month period ending 30 June 1996.

f. It should be noted that these data are based on the Melbourne Port Corporation's audited financial statements for the period 1 March 1996 to 30 June 1997 as published in the 1997 Annual Report.

g. Industry Commission definitions used in Waterline include abnormal items. The 1995/96 figures for Ports Corp South Australia include abnormals of –$49.3 million which relate to a write-down in asset values to accommodate a change in accounting policy to use deprival values. EBIT before abnormals was $17.3 million, operating profit after tax and before abnormals was $6.0 million and return on assets before abnormals was 12.8 per cent in 1995/96.

Source AAPMA.

dividend paid by the Sydney Ports Corporation fell by 3 per cent in 1996/97. As in 1995/96, no dividend was paid by the Fremantle Port Authority in 1996/97.

The *dividend* payout ratio (dividends paid out as a proportion of operating profit) fell for the Port of Brisbane Corporation (6 per cent) and rose by 8 per cent for the Sydney Ports Corporation in 1996/97.

Debt and equity

Total debt in 1996/97 remained unchanged for the Port of Brisbane Corporation and increased marginally for the Sydney Ports Corporation. Ports Corp South Australia reduced its total debt level by 31 per cent in 1996/97, while the Fremantle Port Authority reduced its total debt by 19 per cent in the same period. Since 1994/95, the Adelaide and Fremantle port authorities/corporations have reduced their total debt levels by 38 per cent and 31 per cent respectively.

Total equity in 1996/97 increased for the Brisbane, Sydney, Adelaide and Fremantle port authorities/corporations. The significant rise in total equity for the Fremantle Port Authority reflects the 1996 agreement between the Authority and the Western Australian Treasury, where the latter took over direct responsibility for payments relating to the Authority's superannuation pension liability for past employees. This transfer of responsibilities was finalised on 30 June 1997, when the WA Treasury took over the balance of the liability (approximately $25.9 million).

The *debt/equity* ratio for the Port of Brisbane Corporation remained unchanged in 1996/97. The debt/equity ratio for the Sydney Ports Corporation decreased by 6 per cent in 1996/97. A decrease in total debt and an increase in total equity resulted in a 34 per cent reduction in the debt to equity ratio for Ports Corp South Australia.

PORT PERFORMANCE - NON-FINANCIAL

Information on aspects of non-financial performance for the five mainland capital city ports in 1997 is presented in table 9.

Cargo throughput

Total cargo throughput at the five ports fell in the July to December 1997 period to 43.6 million tonnes, compared with 45.4 million tonnes in the January to June 1997 period. There were increases in throughput at Sydney (8.7 per cent) and Melbourne (2.7 per cent). Decreases at Brisbane (9.4 per cent), Adelaide (23.4 per cent) and Fremantle (10.3 per cent) resulted in an overall decline of 4 per cent in total throughput for the five ports.

The total cargo throughput for the five ports in the July to December 1997 period represents a 2.4 per cent increase compared with the same period in 1996.

The tonnage of *non-containerised general cargo* handled at the five ports increased by 12.6 per cent in the July to December 1997 period to 2.5 million tonnes, compared with

2.2 million tonnes in the January to June 1997 period. All five ports made a positive contribution to this increase, with Brisbane recording the largest increase (31 per cent) and Sydney the smallest increase (3.1 per cent).

The non-containerised general cargo throughput for the five ports in the July to December 1997 period represents a 9.1 per cent increase compared with the same period in 1996.

Measured in teus, *container traffic* for the five ports increased by 15.6 per cent in the July to December 1997 period to 1.3 million teus, compared with 1.1 million teus in January to June 1997. However, the throughput of loaded teus increased by only 14.3 per cent, with loaded import containers increasing 18.8 per cent and loaded export containers increasing 9.2 per cent.

The throughput of loaded containers increased at all five ports in the July to December 1997 period. For loaded import containers, these increases ranged from 26 per cent in Brisbane to 16 per cent in Melbourne. For loaded export containers, the largest increase was at Sydney (15.4 per cent), while the smallest increase was at Melbourne (6.3 per cent).

Compared with the July to December 1996 period, total container traffic increased by 11.5 per cent for the five ports in the July to December 1997 period, with loaded container throughput increasing by 11.3 per cent.

Employment

Table 9 indicates that *average total employment* at the five mainland capital city port authorities/corporations fell by 10.6 per cent in the July to December 1997 period. This follows a 5.1 per cent fall between July–December 1996 and January–June 1997, and represents a 15.2 per cent fall in average total employment over the past year.

In the July to December 1997 period, average total employment fell for all five port authorities/corporations. The largest reduction in employment numbers occurred in Ports Corp South Australia (16.7 per cent), the Port of Brisbane Corporation (15.5 per cent) and the Sydney Ports Corporation (11.8 per cent).

Ship turnaround time

In the July to December 1997 period, the median turnaround time for ships calling at the mainland capital city container terminals increased by approximately 5 per cent at Brisbane, Sydney, and Melbourne, and increased by 6.5 per cent at Adelaide, compared with January to June 1997. Figures were unavailable for Fremantle at the time of printing.

The 95th percentile figure indicates the longest turnaround time for all but the longest 5 per cent of port calls. Compared with the January to June 1997 period, the 95th percentile ship turnaround time fell marginally at Brisbane and fell by 2.5 per cent at Sydney. However, the 95th percentile ship turnaround time increased by 6.1 per cent at Melbourne and 30.7 per cent at Adelaide. Caution should be taken in interpreting the result for Adelaide, as the small number of ships visiting that port can lead to large variations from one period to the next. For example, the July to December 1997 95th percentile ship turnaround time at Adelaide is similar to that experienced for the same period in 1996.

TABLE 9 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1997

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five ports[d]	
Indicator	**Jan–Jun**	**Jul–Dec**	**Jan–Jun**	**Jul–Dec**	**Jan–Jun**	**Jul–Dec**	**Jan–Jun**	**Jul–Dec**	**Jan–Jun**	**Jul–Dec**	**Jan–Jun**	**Jul–Dec**
Total cargo throughput ('000 tonnes)	10740	9733	10482	11390	9188	9434	3118	2387	11836	10612	45364	43557
Non-containerised general cargo ('000 tonnes)[a]	412	540	392	404	959	1057	129	150	353	377	2245	2527
Containerised cargo (teus exchanged)												
Full import	43883	55283	180102	214301	209843	243319	13226	16261	44125	54176	491179	583340
Empty import	23720	26982	9419	8165	34265	39124	5866	8461	9318	10474	82588	93206
Full export	61627	67356	115636	133463	200601	213186	22895	24630	43079	46444	443838	485079
Empty export	7650	10165	52172	62252	35477	49080	1500	2939	7802	10946	104601	135382
Total teus	136880	159786	357329	418181	480186	544709	43487	52291	104324	122040	1122206	1297007
Average total employment[b]	213	180	229	202	71	70	204	170	191	189	907	811
Turnaround time (hrs)[c]												
Median result	30.3	31.9	36.1	37.8	39.0	41.1	17.0	18.1	22.7	na	-	-
95th percentile	53.7	53.5	68.8	67.1	68.6	72.8	28.3	37.0	53.5	na	-	-

- not applicable
na not available
a. Excludes bulk cargoes.
b. Comparisons between ports are not appropriate since each port authority/corporation has a different role and structure.
c. Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.
d. Components may not sum to totals due to rounding.
Source AAPMA.

CREW TO BERTH RATIOS

The BTCE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship(s) operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 8 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the BTCE is still in the process of auditing the data, the December quarter 1997 merchant shipping data in this issue of *Waterline* are classified as preliminary.

The *crew to berth ratio* for merchant shipping was 2.123 in the December quarter, compared with 2.152 in the September quarter and below the initial level of 2.133 in the September quarter 1993.

Table 10 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the December quarter. *Ship time* is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio was 1.028 in the December quarter, compared with 1.035 in the previous quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35 hour week. The accrued leave ratio was 0.962 in the December quarter, compared with 0.967 in the September quarter.

Other changes in the components of the merchant shipping crew to berth ratio were:

- *Compensation leave* fell to 0.062 in the December quarter after a rise in the previous quarter to 0.066;
- *Study leave* fell to 0.027 in the December quarter, down from 0.041 in the previous quarter; and
- *Training and other paid leave* was 0.009 in the December quarter, compared with 0.008 in the September quarter.

The *long service leave* ratio for merchant shipping in the December quarter was unchanged at 0.035.

Offshore shipping

Figure 9 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. As the BTCE is still in the process of auditing the data, the December quarter 1997 offshore shipping data in this issue of *Waterline* are classified as preliminary.

The crew to berth ratio for offshore shipping was 2.334 in the December quarter, compared with 2.366 in the September quarter. The December quarter crew to berth ratio is the lowest since the December quarter 1995 (2.329), but remains above the initial March quarter 1995 level of 2.327.

Table 11 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the December quarter. *Accrued leave* is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two crew duty system, annual leave and time spent travelling in off duty time. The accrued leave ratio for the December quarter was 1.151, compared with 1.153 in the September quarter.

Ship time also represents a significant part of the offshore crew to berth ratio, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio for the December quarter was 1.016, compared with 1.010 in the previous quarter.

All other components of the offshore crew to berth ratio fell in the December quarter. In particular, the *compensation leave* ratio fell to below the initial March quarter 1995 level (0.097, compared with 0.100).

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

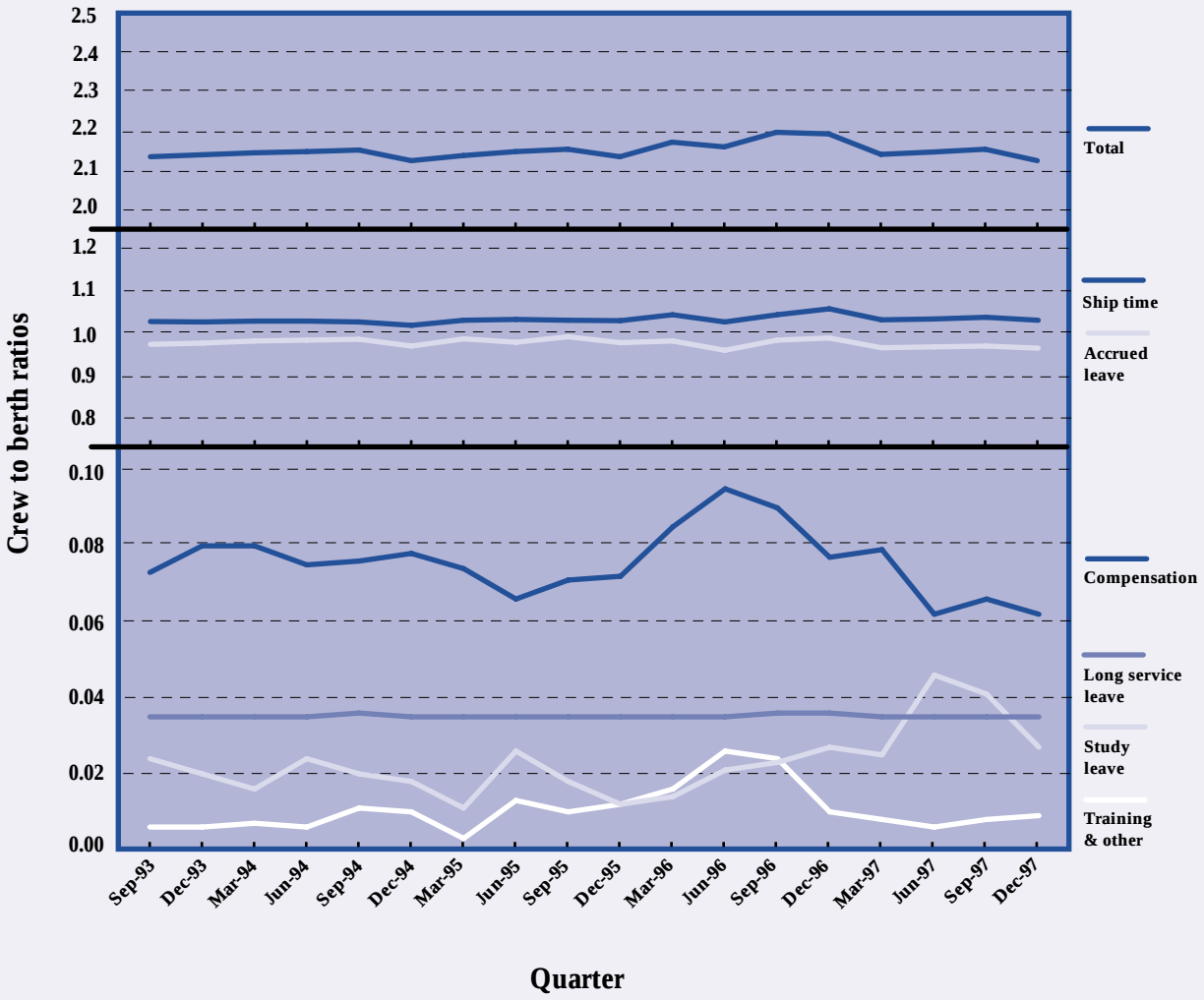


TABLE 10 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1997[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.041	0.970	0.033	0.035	0.064	0.021	2.164
Engineers	1.043	0.983	0.038	0.036	0.056	0.017	2.172
All officers	1.042	0.977	0.036	0.035	0.060	0.019	2.168
Integrated ratings	1.013	0.949	0.089	0.034	0.000	0.000	2.085
Catering crew	1.023	0.952	0.076	0.034	0.000	0.000	2.086
All ratings	1.016	0.950	0.085	0.034	0.000	0.000	2.085
All crew	1.028	0.962	0.062	0.035	0.027	0.009	2.123
Previous quarter	1.035	0.967	0.066	0.035	0.041	0.008	2.152
Initial level[b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p Provisional.
a. Components may not sum to totals due to rounding.
b. Initial level for September quarter 1993.

Source Data provided by ship operators.

FIGURE 9 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

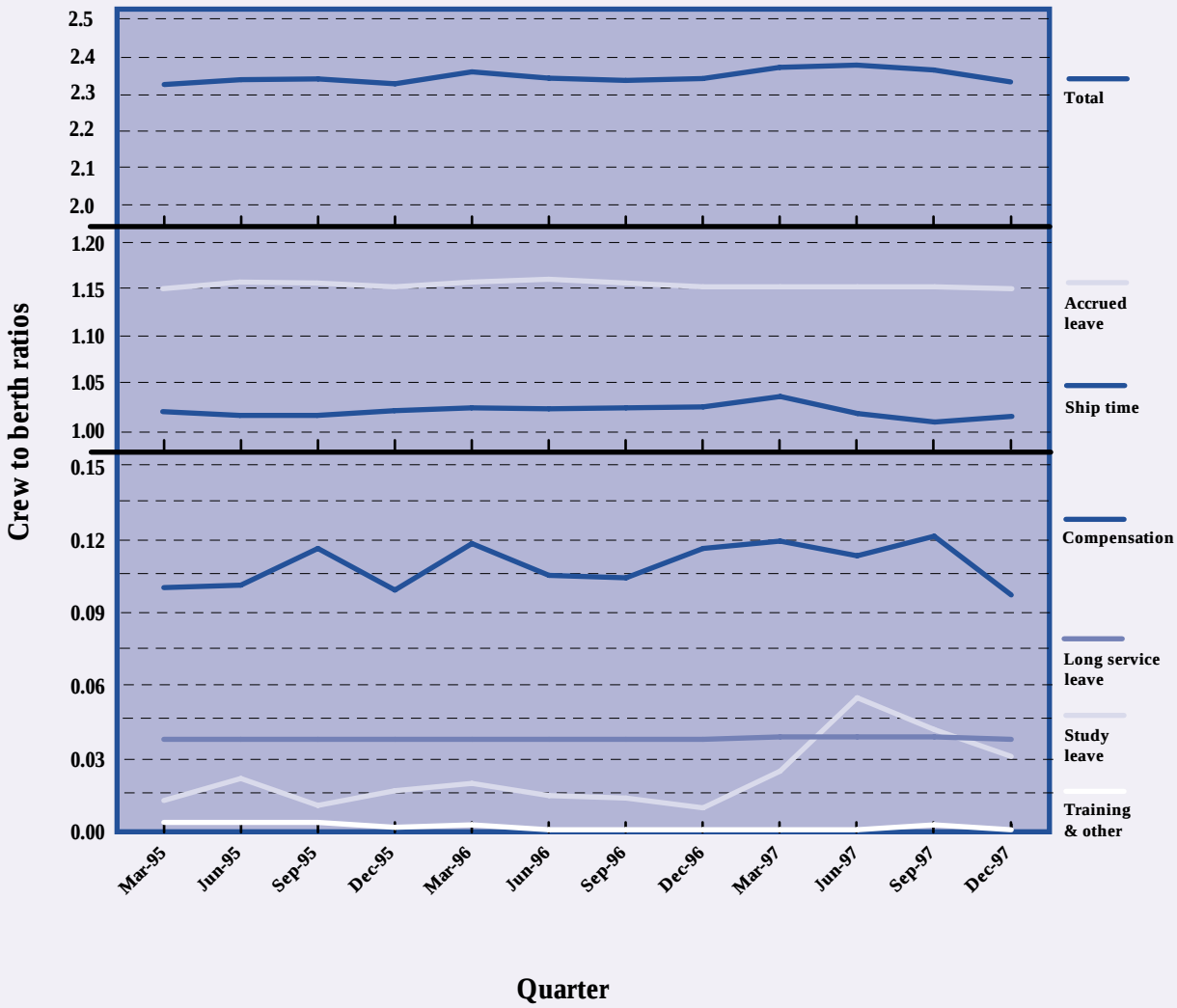


TABLE 11 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1997[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.015	1.153	0.022	0.038	0.080	0.000	2.308
Engineers	1.016	1.153	0.028	0.037	0.050	0.000	2.285
All officers	1.016	1.153	0.025	0.038	0.065	0.000	2.297
Integrated ratings	1.011	1.150	0.149	0.038	0.000	0.000	2.348
Catering crew	1.043	1.153	0.258	0.041	0.000	0.000	2.495
All ratings	1.015	1.150	0.163	0.039	0.000	0.000	2.368
All crew	1.016	1.151	0.097	0.038	0.031	0.000	2.334
Previous quarter	1.010	1.153	0.121	0.039	0.042	0.002	2.366
Initial level[b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p Provisional.
a. Components may not sum to totals due to rounding.
b. Initial level for March quarter 1995.

Source Data provided by ship operators.

SINGLE VOYAGE PERMITS

The *Navigation Act 1912* provides for licensed vessels to carry passengers and cargo in the coasting trade. The Act does not restrict the class of vessels that may obtain a Coasting Trade Licence. Any ship regardless of registry can obtain a licence provided the crew are paid Australian wages, the ship is not in receipt of foreign government subsidies, and the ship has not received such a subsidy in the previous twelve months.

Ships that obtain a licence must also conform to the requirements of the Navigation Act including specified safety, manning, crew qualifications and rehabilitation and compensation provisions. Where suitable licensed vessels are not available, the Act also provides for the issue of single or continuing voyage permits to unlicensed vessels, where this is considered to be in the public interest.

The application fee for a passenger single voyage permit is $22 and for a cargo single voyage permit (SVP) $200. The application fee for a continuing voyage permit (CVP) is $400.

Table 12 provides information on the number of SVPs used and the cargo carried from 1990/91 to 1996/97. The number of SVPs used has increased by 300 per cent over the past 7 years.

Details of the single voyage permits (SVPs) for cargo issued during the period 1 October to 31 December 1997 are available on the Internet site of the Department of Workplace Relations and Small Business at http://www.dir.gov.au/. Supplementary information will be added to the Internet site shortly, including a summary table showing the number of SVPs issued by cargo type (see table 13).

Table 13 shows a continuation of the upward trend in the number of SVPs being used to transport domestic cargo around the coast. The data for the corresponding quarter in 1996 were 146 SVPs used for the carriage of 1.1 million tonnes of cargo. (Table 12 provides information on the number of SVPs used while table 13 shows the number of SVPs issued. Although the two tables are not strictly comparable, most SVPs issued are used and therefore the differences in the data are likely to be minor and not significant.)

Containerised cargo permits continue to be the major component of SVPs issued. It was in this category that the most significant increase occurred.

The increasing number of permits for the coastal trade reflects an increase in shippers' requirements that cannot be met by local ship operators.

TABLE 12 SINGLE VOYAGE PERMITS USED AND CARGO CARRIED, 1990/91 TO 1996/97

Year	Jul–Sep		Oct–Dec		Jan–Mar		Apr–Jun		Total	
	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes
1990/91	32	195711	38	450622	44	262431	26	189565	140	1098329
1991/92	34	422161	61	414191	49	243049	59	241373	203	1320774
1992/93	62	238017	69	147514	83	211430	93	298769	307	895730
1993/94	108	202252	125	292664	119	412029	118	498571	470	1405516
1994/95	110	899222	112	970068	116	832308	90	665499	428	3367097
1995/96	91	1077022	100	653940	107	575662	123	930077	421	3236701
1996/97	142	1026438	146	1110332	135	661784	149	1056709	572	3855263

Source Maritime Transport Division of the Department of Workplace Relations and Small Business.

TABLE 13 SINGLE VOYAGE PERMITS, DECEMBER QUARTER 1997[a]

Cargo type	Permits	Tonnes
Petroleum products	11	249800
Crude oil and feedstock	12	454200
Liquefied gas	3	11740
Other bulk liquids	14	53900
Dry bulk	9	332400
General cargo		
- containerised	163	210594
- break bulk	12	6624
Total	224	1319258

a. The number of single voyage permits issued and cargo to be carried, 1 October to 31 December 1997.

Source Maritime Transport Division of the Department of Workplace Relations and Small Business.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BTCE	Bureau of Transport and Communications Economics
GRT	Gross Registered Tonnage
LOA	Length Overall
NRT	Net Registered Tonnage
SVP	Single voyage permit
teu	Twenty-foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

Issue number 15 of Waterline is due for release on 30 June 1998

Some recent BTCE publications

SEA

Tasmanian freight equalisation scheme: Discussion paper: September 1996
(1996) Free from BTCE
Working paper 28

AIR

AEROCOST
An aircraft direct cost operating model
$850 from BTCE. Demo disk available.

ROAD

Roads 2020
(1997) Free from BTCE
Working Paper 35

GENERAL

Tradeable permits in transport?
(1998) Free from BTCE
Working Paper 37

Publications available from BTCE Information Services. Tel (02) 6274 6846

TABLE 14 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—TEUS PER HOUR

	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97
Brisbane																	
Ships handled	111	112	140	140	187	136	123	135	132	124	133	140	141	156	164	162	177
Total teus	46529	37820	52983	51596	50574	41723	47065	58851	46439	39037	51008	66115	62904	47471	65572	73184	71043
Crane rate	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5
Elapsed rate	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8
Net rate	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2
Sydney																	
Ships handled	238	177	240	223	221	218	202	192	203	206	216	228	249	251	249	243	266
Total teus	139321	116914	129586	142659	152326	144868	140113	148431	143746	146038	148290	156344	174982	158323	167705	183978	201535
Crane rate	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.5	19.9	20.3	19.6	22.3	22.6	23.5	23.5
Elapsed rate	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2
Net rate	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	28.0	27.9	29.5	28.9	32.2	32.7	36.1	35.5
Melbourne																	
Ships handled	306	211	265	267	244	265	228	221	227	228	262	274	282	230	249	268	281
Total teus	143350	153420	158849	159039	180134	173338	152983	161943	173566	162911	170884	203371	202376	162156	177070	208200	223465
Crane rate	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6
Elapsed rate	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2
Net rate	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7
Adelaide																	
Ships handled	26	28	34	31	33	35	50	34	42	47	63	70	74	69	65	68	66
Total teus	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	23351	21963	20933	25982	25188
Crane rate	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0
Elapsed rate	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4
Net rate	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5
Fremantle																	
Ships handled	115	127	135	121	124	128	136	139	124	143	153	159	161	159	164	166	173
Total teus	40910	40587	40986	36635	46969	44388	45308	50050	44662	47597	51113	50791	55593	51784	52092	57903	64243
Crane rate	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6
Elapsed rate	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2
Net rate	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8
Five ports																	
Ships handled	796	655	814	782	809	782	739	721	728	748	827	871	907	865	891	907	963
Total teus	382726	361984	394865	403096	445041	421149	407145	433594	425731	411538	440098	497140	519206	441697	483372	549247	585474
Crane rate	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3
Elapsed rate	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8
Net rate	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8

na not available

Notes 1. Elapsed rates and net rates from the March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide), due to changes in a terminal operator's information systems.

2. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.

ACKNOWLEDGMENTS

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This publication is available free of charge from the Manager, Information Services, Bureau of Transport and Communications Economics, GPO Box 501, Canberra, ACT, 2601, Australia. Tel (02) 6274 6846.

Internet:

http://www.dot.gov.au/programs/btce/btcehome.htm

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WATERLINE

JUNE 1998 ISSUE NO. 15

BUREAU OF TRANSPORT ECONOMICS

IN BRIEF

Stevedoring productivity

This edition of *Waterline* contains the March quarter 1998 container stevedoring productivity indicators, which coincide with the period immediately prior to the recent waterfront dispute involving Patrick stevedoring operations.

Beginning in this issue, the stevedoring productivity charts (figures 1 to 6) reflect the *containers per hour* data (table 1) rather than the *teus per hour* data (table 8). In addition, table 1 has been expanded to include ship visit and container throughput data, as well as the *elapsed time not worked* indicator.

The March quarter five-port average stevedoring indicators show no significant change from the December quarter 1997. On a port by port basis, only Sydney and Adelaide showed notable changes in stevedoring productivity. In Sydney all three productivity indicators fell by a significant amount, with the elapsed and net rates falling by 2 containers per hour. In Adelaide all three productivity indicators improved by a small amount.

Container ship visits and container throughput decreased for all five ports in the March quarter 1998 (down 5.6 and 9.7 per cent respectively for the five-port total compared with the previous quarter). However, there was an overall increase in the number of ship visits compared with the same quarter in 1997 (5 per cent); this increase was due mainly to a large rise in ship visits in Melbourne (up 20 per cent). All five ports experienced an increase in container throughput in the March quarter 1998 compared with the same quarter in 1997, resulting in a 17.9 per cent increase in the five-port total.

page two

Waterfront reliability

Berth availability within four hours of the scheduled time rose to 88 per cent in the March quarter 1998, from 84 per cent in the December quarter 1997. Availability of pilots and tugs within one hour of the confirmed time was 100 per cent, the same as the figure in the previous quarter.

The proportion of ship calls affected by other waiting time incidents increased to 51 per cent in the March quarter, from 41 per cent in the December quarter.

The available data indicate that there was significant inter-port variation in aspects of stevedoring reliability in the March quarter. Ship arrival advice provided inside the 24 hours prior to actual arrival was more accurate, and less variable between ports, than advice provided up to the 24 hour point.

page five

Monitoring BSPVES

This article provides an overview of the 1998 report, *Bass Strait Passenger Vehicle Equalisation Scheme: BTCE Monitoring Report Number 1*. The report is the first review of the Bass Strait Passenger Vehicle Equalisation Scheme by the Bureau, as required by the Ministerial Directions under which the Scheme operates.

Since the report only covered the first 10 months of the Scheme's operation (1 September 1996 to 30 June 1997) it was too early to draw any firm conclusions about the effectiveness of the Scheme. Nevertheless, the report found that there was little doubt that the introduction of the Scheme had contributed to the improved financial performance of TT Line, notwithstanding that TT Line may have passed on some of the indirect benefits it derived from the Scheme through increased discounting during the off peak season.

page seven

Crew to berth ratios

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship(s) operated.

The crew to berth ratio for merchant shipping was 2.104 (preliminary) in the March quarter 1998, compared with 2.123 in the December quarter 1997, and below the initial level of 2.133 in the September quarter 1993.

The crew to berth ratio for offshore shipping was 2.337 (preliminary) in the March quarter 1998, compared with 2.334 in the December quarter 1997, and the initial March quarter 1995 level of 2.327.

page nine

BTE AGAIN

The more things change…
Since the last issue of *Waterline* the communications function of the former Bureau of Transport and Communications Economics has been transferred to the Department of Communications and the Arts. Consequently, the BTCE has been renamed the Bureau of Transport Economics (BTE). This administrative change has not affected the Bureau's normal transport research activities.

STEVEDORING PRODUCTIVITY

Table 1 and figures 1 to 6 present the December 1995 to March 1998 indicators of stevedoring productivity for the major Australian container terminals, expressed in *container moves per hour*. The data for Brisbane, Sydney, Melbourne and Fremantle are averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the SeaLand terminal.

Please note that:

- the March quarter 1998 data reflect the period before the recent industrial dispute involving Patrick.
- because of the absence of Fremantle elapsed rate data from one operator, the five-port average elapsed rate cannot be calculated for the March quarter and thus the average published here is only for four ports. However, given that the five-port average is dominated by Melbourne and Sydney, the provisional five-port average is a reasonable approximation.
- as the net rate data for Brisbane, Sydney, Melbourne and Fremantle for one operator have not been finalised for the March quarter, the associated net rates are provisional at this stage.

Overall national stevedoring productivity, as measured by the five-port average, did not change significantly in the March quarter 1998 as compared with the December quarter 1997:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 18.8 containers per hour compared with 18.5 in the December quarter;
- the five-port average *elapsed rate* (productivity *per ship* based on the time labour is aboard the ship) is not comparable with the previous quarter in the absence of a complete set of data for Fremantle; and
- the five-port average *net rate* (productivity *per ship* while the ship is worked) was 23.7 containers per hour (provisional) compared with 24.3 containers per hour in the December quarter.

Brisbane average crane rates were 18.0 containers per hour in the March quarter, up from 16.8 in the December quarter. The elapsed rate of 16.4 containers per hour, and the net rate of 19.3 containers per hour (provisional) were not significantly different from the December quarter rates. Consequently, there was little change in the average proportion of elapsed time not worked. The March quarter container exchange was 15.2 per cent down on the December quarter figure, but up 20.9 per cent compared with the March quarter 1997.

Sydney average crane rates were 17.5 containers per hour in the March quarter, down from 18.4 in the December quarter. The March quarter elapsed and net rates were 19.9 containers per hour and 25.7 (provisional) containers per hour, down significantly from the previous quarter (21.9 and 27.7, respectively). The average proportion of elapsed time not worked was 22.5 per cent (provisional) in the March quarter. The March quarter container exchange was 12.6 per cent down on the December quarter figure, but up 9 per cent compared with the March quarter 1997.

Melbourne average crane rates were 19.5 containers per hour in the March quarter, up from 18.8 in the December quarter. The elapsed rate of 20.1 containers per hour and the net rate of 22.8 containers per hour (provisional) did not change significantly from the previous quarter, resulting in a similar proportion of elapsed time not worked. The March quarter container exchange was 6.7 per cent down on the December quarter figure, but up 27.5 per cent compared with the March quarter 1997.

Adelaide average crane rates were 22.5 containers per hour in the March quarter, up from 21.4 in the December quarter. This continues the trend of gradual improvement in Adelaide stevedoring productivity, resulting in an overall increase of 20 per cent since the December quarter 1995. While Melbourne and Fremantle have had improvements of similar magnitude, both started from a lower base. The Adelaide elapsed rate of 29.6 containers per hour and the net rate of 30.7 containers per hour were both up marginally on the December quarter rates. The average proportion of elapsed time not worked was 3.6 per cent in the March quarter, a small rise on the 3 per cent for the previous quarter. The March quarter container exchange was 12.6 per cent down on the December quarter figure but up 3.9 per cent compared to the March quarter 1997.

Fremantle average crane rates were 19.6 containers per hour in the March quarter, up from 18.9 containers per hour in the December quarter. The elapsed data for March have not yet been received from one operator and therefore no indicator has been produced for this quarter. The net rate of 22.8 containers per hour (provisional) was down slightly on the December quarter rates. The March quarter container exchange was 4 per cent down on the December quarter figure, but up 17.7 per cent compared with the March quarter 1997.

Teus per hour

Table 8 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purposes of long-term historical comparison and are not directly comparable with the data in table 1. This is because indicators based on teus per hour may be affected, from one period to the next, by changes in the mix of 20 foot and 40 foot containers. Nevertheless, in the March quarter 1998 the teu-based and container based data generally reflected

similar movements in productivity.

Container port activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. Compared with the previous quarter, in the March quarter 1998 there were decreases in both the number of container ship visits and container throughput for all five-ports (down 5.6 and 9.7 per cent, respectively, for the five-port total). However, there was an overall increase in the number of ship visits compared with the same quarter in 1997 (5.1 per cent); this increase was due mainly to a large rise in ship visits in Melbourne (up 20 per cent). All five ports experienced an increase in container throughput in the March quarter 1998 compared with the same quarter in 1997, resulting in a 17.9 per cent increase in the five-port total.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS—PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter									
Port/indicator	**Dec-95**	**Mar-96**	**Jun-96**	**Sep-96**	**Dec-96**	**Mar-97**	**Jun-97**	**Sep-97**	**Dec-97**	**Mar-98**
Brisbane										
Ships handled	132	124	133	140	141	156	164	162	177	170
Total containers	39473[e]	34281	42782	53690	51815	40696	52610	58424	58014	49197
Crane rate	15.8	17.6	16.7	16.5	16.9	17.3	16.4	16.1	16.8	18.0
Elapsed rate	17.0	19.0	17.2	17.2	17.4	17.3	16.6	16.8	16.8	16.4
Net rate	20.6	21.5	20.4	20.4	20.4	19.4	18.7	19.1	19.6	19.3[p]
Elapsed time not worked (per cent)	17.5	11.6	15.7	15.7	15.0	10.8	11.5	11.7	14.6	14.7[p]
Sydney										
Ships handled	203	206	216	228	249	251	249	243	266	238
Total containers	114997[e]	116308	115564	123390	137542	126265	131004	142659	157430	137600
Crane rate	15.0	15.6	16.0	16.1	15.4	17.7	17.7	18.2	18.4	17.5
Elapsed rate	17.6	18.9	17.6	18.2	na	18.2	18.5	21.7	21.9	19.9
Net rate	21.0	22.1	22.4	23.3	22.7	25.7	25.5	27.9	27.7[r]	25.7[p]
Elapsed time not worked (per cent)	16.2	14.5	21.4	21.9	na	29.4	27.6	22.4	20.7	22.5[p]
Melbourne										
Ships handled	227	228	262	274	282	230	249	268	281	276
Total containers	142324[e]	134477	140674	163297	161865	130459	143708	162591	178302	166284
Crane rate	16.3	17.0	18.4	19.6	17.8	19.0	19.0	18.6	18.8	19.5
Elapsed rate	18.8	20.2	20.5	21.1	17.9	19.5	20.3	20.5	19.9	20.1
Net rate	21.9	23.4	25.9	25.6	21.7	23.0	24.0	23.5	22.6	22.8[p]
Elapsed time not worked (per cent)	14.2	13.7	20.8	17.6	17.8	15.3	15.4	13.0	11.9	11.8[p]
Adelaide										
Ships handled	42	47	63	70	74	69	65	68	66	60
Total containers	14893[e]	13982	15874	17415	19047	17486	16874	20974	20773	18163
Crane rate	18.8	18.9	18.2	19.3	19.6	19.6	21.0	21.1	21.4	22.5
Elapsed rate	22.8	23.3	22.0	22.2	22.6	24.0	28.3	28.4	29.2	29.6
Net rate	23.3	23.8	22.5	22.8	23.1	24.6	29.1	29.2	30.1	30.7
Elapsed time not worked (per cent)	2.1	2.1	2.2	2.6	2.2	2.4	2.7	2.7	3.0	3.6
Fremantle										
Ships handled	124	143	153	159	161	159	164	166	173	165
Total containers	37963[e]	40008	43581	42409	46707	42942	43081	47205	52603	50525
Crane rate	16.2	17.9	20.0	17.8	18.2	19.4	19.0	18.8	18.9	19.6
Elapsed rate	13.4	15.7	14.8	13.4	15.6	16.2	15.9	17.0	18.9	na
Net rate	16.7	18.9	20.0	19.4	20.5	20.6	19.8	20.6	23.2	22.8[p]
Elapsed time not worked (per cent)	19.8	16.9	26.0	30.9	23.9	21.5	19.5	17.6	18.4	na
Five ports										
Ships handled	728	748	827	871	907	865	891	907	963	909
Total containers	349650[e]	339056	358475	400201	416977	357848	387277	431853	467122	421769
Crane rate	15.9	16.9	17.7	18.0	17.1	18.4	18.3	18.3	18.5	18.8
Elapsed rate	17.7	19.3	18.6	19.0	na	18.6	19.0	20.4	20.5	20.0[a]
Net rate	20.9	22.3	23.4	23.5	21.8	23.4	23.6	24.3	24.3	23.7[p]
Elapsed time not worked (per cent)	15.3	13.5	20.5	19.1	na	20.3	19.2	16.2	15.7	15.5[a]

p *provisional*
r *revised*
na *not available*
a. *Four-port average only, as Fremantle elapsed rate data were not available at time of publication.*
e. *BTE estimate.*

Notes 1. *Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.*
2. *The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 8.*
3. *Elapsed time not worked is the difference between the net and elapsed rates (unrounded) as a percentage of the net rate.*

Sources *Patrick, P&O Ports and SeaLand.*

CONTAINER TERMINAL PERFORMANCE—CONTAINERS PER HOUR

FIGURE 1 FIVE MAJOR PORTS

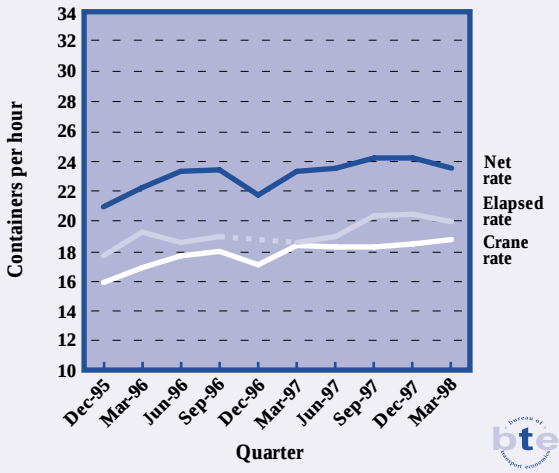


FIGURE 2 BRISBANE

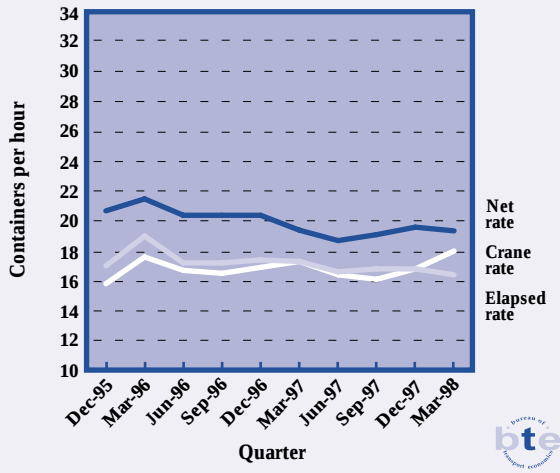


FIGURE 3 SYDNEY

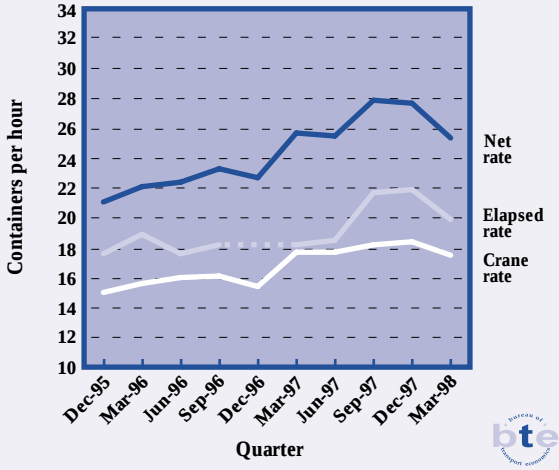


FIGURE 4 MELBOURNE

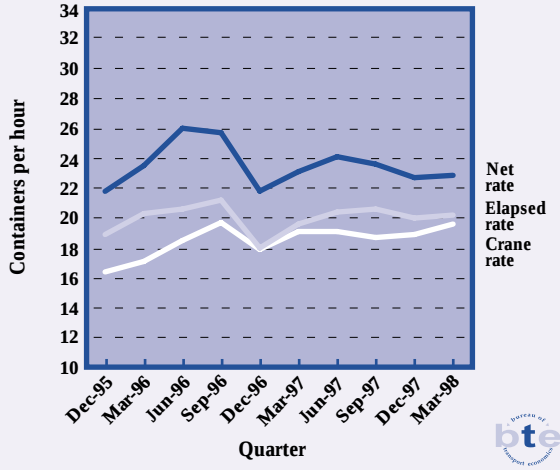


FIGURE 5 ADELAIDE

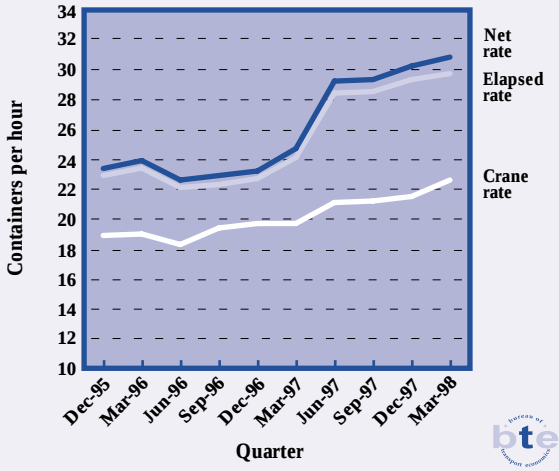
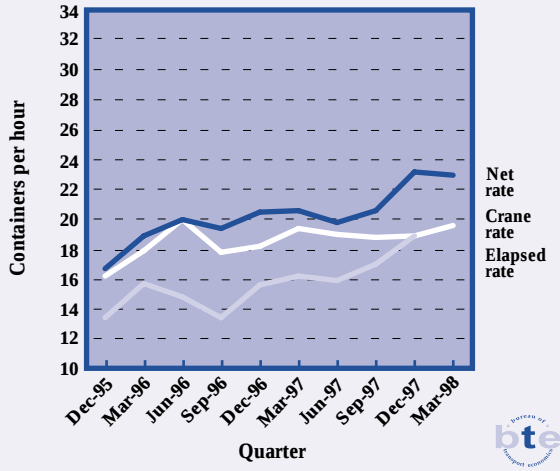


FIGURE 6 FREMANTLE



Note *Elapsed rates and net rates from the March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.*

Sources *Patrick, P&O Ports and SeaLand.*

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the March quarter 1998. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

The sample for the March quarter covers 268 ship calls, equivalent to almost 30 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 22 per cent at Brisbane to 40 per cent at Adelaide.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 88 per cent in the March quarter 1998, up from 84 per cent in the December quarter 1997. The indicator ranged between 89 per cent and 92 per cent in the first three quarters of 1997, the earliest periods for which data are available.

The increase in berth availability between the December quarter 1997 and the March quarter 1998 mainly reflected improvements at Melbourne and Fremantle. Caution should be used in undertaking inter-port comparisons of berth availability, as there is significant variation between ports in sample sizes and ship call patterns.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportions were 100 per cent in the March quarter, the same as the figures in the December quarter. The pilotage and towage indicators were also at or close to 100 per cent in the first three quarters of 1997.

Other waiting time

The ten shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments (instances where the shipping line holds the ship off the port or at the berth in order to maintain the fixed-day schedule).

In the March quarter, 51 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. This was significantly higher than the proportion of 41 per cent recorded in the previous quarter. The increase in other waiting time over this period mainly reflected rises in the number of incidents involving early ship arrival, pilot/tug booking times, early completion of stevedoring and weather/tides. The proportion of ship calls affected by other waiting time ranged from 28 per cent to 66 per cent at individual ports in the March quarter.

Table 3 summarises the data on other ship waiting time incidents. The shipping lines identified a total of 176 incidents (affecting 136 ship calls) for the sample of ship calls in the March quarter. One-quarter of the ship calls that incurred other waiting time were affected by two or more incidents.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, MARCH QUARTER 1998

(Number of ship calls)

	Delay (hrs)								Total no. of ship
Port/operation	0	1	2	3	4	5–10	11–20	>20	calls
Brisbane									
Berth availability	**34**	**0**	**0**	**0**	**0**	0	1	2	37
Pilotage	**37**	**0**	0	0	0	0	0	0	37
Towage	**36**	**1**	0	0	0	0	0	0	37
Sydney									
Berth availability	**48**	**0**	**3**	**0**	**1**	6	5	2	65
Pilotage	**65**	**0**	0	0	0	0	0	0	65
Towage	**65**	**0**	0	0	0	0	0	0	65
Melbourne									
Berth availability	**68**	**1**	**0**	**0**	**1**	3	5	4	82
Pilotage	**80**	**2**	0	0	0	0	0	0	82
Towage	**81**	**1**	0	0	0	0	0	0	82
Adelaide									
Berth availability	**20**	**0**	**1**	**0**	**0**	1	0	2	24
Pilotage	**24**	**0**	0	0	0	0	0	0	24
Towage	**24**	**0**	0	0	0	0	0	0	24
Fremantle									
Berth availability	**58**	**0**	**0**	**0**	**0**	0	2	0	60
Pilotage	**60**	**0**	0	0	0	0	0	0	60
Towage	**60**	**0**	0	0	0	0	0	0	60
Five ports									
Berth availability	**228**	**1**	**4**	**0**	**2**	10	13	10	268
Pilotage	**266**	**2**	0	0	0	0	0	0	268
Towage	**266**	**2**	0	0	0	0	0	0	268

Note *Data for individual ports should be interpreted with caution as there is significant inter-port variation in factors such as sample sizes and ship call patterns.*

Source *Data for a sample of ship calls provided by shipping lines.*

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. In the March quarter, five incident types accounted for around two-thirds of the total hours attributable to other ship waiting time:

- Ship arrived early (16.2 per cent);
- Stevedoring finished late (14.0 per cent);
- Industrial action (13.7 per cent);
- Awaiting labour (13.2 per cent);
- Closed port–holidays (10.4 per cent).

Around 58 per cent of the waiting time incidents (51 per cent of waiting time) in the March quarter directly involved waterfront services (mainly items 2 to 5, 7 and 8 in table 3). Another 27 per cent of incidents (32 per cent of waiting time) directly involved ship operations (mainly early/late ship arrival and repairs/maintenance). It is not possible to accurately identify the causes of other waiting time in all instances. For example, late ship arrival may be attributable to slow stevedoring in the previous port, problems with the ship's engines, bad weather or a combination of factors.

The data in table 3 indicate that, for around 6 per cent of ship calls, pilots or tugs could not be booked at the preferred time. As noted in *Waterline* 14, unavailability of a booking at the preferred time for some ship calls may reflect a reasonable trade-off between towage charges (price) and service availability (quality).

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, MARCH QUARTER 1998

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5–10	11–20	>20	Total no. of incidents
Ship arrived early	4	9	3	1	7	3	3	30
Stevedoring finished early	5	9	2	3	6	0	0	25
Awaiting labour	2	0	5	1	10	2	2	22
Stevedoring finished late	1	0	1	1	10	6	1	20
Pilot/tug booking not at preferred time	5	6	5	1	0	0	0	17
Weather or tides	2	3	2	1	2	2	0	12
Industrial action	1	1	0	1	3	2	2	10
Crane breakdown	2	3	1	1	1	0	0	8
Ship repairs or maintenance	0	1	0	1	1	4	1	8
Closed port—holidays	0	0	0	0	0	2	5	7
Awaiting cargo or late cargo changes	0	0	1	1	2	0	0	4
Late ship arrival	0	1	0	0	1	0	2	4
Other[a]	3	3	2	1	0	0	0	9
Total incidents	**25**	**36**	**22**	**13**	**43**	**21**	**16**	**176[b]**

a. Mainly involves faulty lashing gear and channel unavailable due to other ship movements.
b. These incidents affected 136 of the 268 ship calls covered in table 2.

Source Data for a sample of ship calls provided by shipping lines.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, DECEMBER QUARTER 1997 AND MARCH QUARTER 1998

(per cent)

Indicator	Brisbane Oct–Dec	Brisbane Jan–Mar	Sydney Oct–Dec	Sydney Jan–Mar	Melbourne Oct–Dec	Melbourne Jan–Mar	Adelaide Oct–Dec	Adelaide Jan–Mar	Fremantle Oct–Dec	Fremantle Jan–Mar
Stevedoring										
Stevedoring completion	58	60	27	28	na	na	na	na	na	na
Stevodoring rate	49	48	60	61	59	63	na	na	na	na
Cargo receival	93	93	85	82	97	93	na	na	na	na
Ship arrival										
Advice at 24 hrs	74	60	60	51	na	na	91	43[a]	53	56
Advice inside 24 hrs	91	94	94	91	na	na	na	na	86[r]	93

r revised to incorporate amended data provided by port authority
na not available
a. Low figure for Adelaide is reportedly attributable to industrial issues at other ports.

Sources AAPMA, Patrick and P&O Ports.

Stevedoring

Table 4 presents the available information on three aspects of stevedoring reliability at the major container terminals — stevedoring completion, stevedoring rate and cargo receival. March quarter data are not available for Fremantle due to upgrading work on one terminal operator's information system.

Stevedoring completion provides a partial indicator of the accuracy with which stevedoring time is predicted. It is defined as the proportion of ship visits where stevedoring completion time is within one hour (plus or minus) of the time initially agreed when the overall work program for the ship is prepared. The available data, which are currently limited to Brisbane and Sydney, suggest that stevedoring completion varied significantly between the two ports in both the December and March quarters.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The stevedoring rate indicator ranged from 48 per cent to 63 per cent at the three ports for which data are available for the March quarter. This was similar to the range in the December quarter. Factors which potentially affect the stevedoring rate indicator include the mix of ships handled at each port, typical cargo stowage patterns on the ships and operating practices at the terminals.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container terminal performance. In the March quarter the cargo receival indicator ranged between 82 per cent and 93 per cent at the three ports for which data are available.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice. The accuracy of this advice potentially affects the ability of waterfront operators to provide services at the times required by shipping lines.

The first indicator of ship arrival advice is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority / corporation *at 24 hours prior to actual arrival*. The proportion at the four ports for which data are available ranged between 43 per cent and 60 per cent in the March quarter. The relatively low figure for Adelaide is reportedly attributable to industrial issues at other ports.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. The proportion at the four ports for which data are available ranged between 91 per cent and 94 per cent in the March quarter.

Concluding comments

Berth availability increased to 88 per cent in the March quarter. The availability of pilots and tugs at the confirmed time remained at 100 per cent. The overall proportion of ship calls affected by other waiting time increased to 51 per cent, from 41 per cent in the previous quarter. The available data indicate significant inter-port variation in aspects of stevedoring reliability in the March quarter. Ship arrival advice provided inside the 24 hours prior to actual arrival was more accurate, and less variable between ports, than advice provided up to the 24 hour point.

REVIEW OF THE BASS STRAIT PASSENGER VEHICLE EQUALISATION SCHEME

This article provides an overview of 1998 report *Bass Strait Passenger Vehicle Equalisation Scheme: BTCE Monitoring Report Number 1*. Copies of the full report can be obtained by contacting the BTE.

Introduction

In August 1996, the then Commonwealth Minister for Transport and Regional Development announced the introduction of the Bass Strait Passenger Vehicle Equalisation Scheme (the Scheme), effective from 1 September 1996. The Scheme provides a rebate against the fare charged by a ferry operator to transport an eligible passenger vehicle plus driver by sea across Bass Strait, and gives effect to the Government's election commitment to provide a rebate of up to $300 for a return trip.

The Scheme operates under a set of Ministerial Directions and is administered by the Commonwealth's Tasmanian Assistance Team in Hobart. Although the Scheme was originally overseen by the Department of Transport and Regional Development's (DoTRD) Maritime Division, new administrative arrangements in October 1997 resulted in the maritime functions of DoTRD being transferred to the Department of Workplace Relations and Small Business. Since then a new set of Directions has been approved by the Minister for Workplace Relations and Small Business.

Monitoring of the effectiveness of the scheme

Clause 16 of the Directions provides for the annual monitoring of the effectiveness of the Scheme by the BTE. The report argues that the effectiveness of the Scheme would depend on:

- the extent to which eligible passengers benefited from lower net fares;
- changes in eligible passenger demand, and in the demand of those accompanying eligible passengers, as a result of lower net fares;
- changes in unit operating costs to the service operator and the degree to which any savings are passed on to all passengers through lower gross fares; and
- the resulting change in total demand for passengers travelling across Bass Strait, including travel by air, and the origin of this traffic.

The report is the first to be undertaken, and covers only the first 10 months of the Scheme's operation (1 September 1996 to 30 June 1997), and so provides only an initial indication of the overall effectiveness of the Scheme.

Calculation of the rebate

The rebate is calculated on the basis of charging a net fare for an eligible passenger vehicle plus driver, travelling in standard share cabin accommodation, that is comparable to the notional cost of driving an equivalent distance on a highway.

The equivalent highway cost is based upon the sea distance of 427 kilometres between the ports of Devonport and Melbourne multiplied by an estimated running cost for an average family car (39.87 cents per kilometre). This provides an equivalent highway cost of $170 for a one-way trip.

For the purposes of the rebate calculation, the fare for an 'inside cabin' on the *Spirit of Tasmania* is used as the passenger fare benchmark. This accommodation represents approximately 50 per cent of the berths available on the *Spirit of Tasmania*. The benchmark passenger vehicle fare has been based on the fare for a passenger vehicle of no more than five metres in length.

Due to the seasonal nature of demand, both the passenger and vehicle fares vary according to three seasons (high, shoulder and off peak seasons). Consequently, the rebate varies, with the largest rebate being applied during the high season and smallest rebate being applied during the off season, to provide an approximation of the equivalent highway cost across all seasons. The rebates applied during the monitoring period are provided in table 5.

Method of payment

The rebate is an 'up front' subsidy. That is, the rebate is provided to the driver of an eligible passenger vehicle as a reduction in the fare charged by the service operator. The onus is on the service operator to determine the eligibility of the passenger for the rebate, apply the rebate to the passenger's gross fare, and claim reimbursement of the rebate from the Commonwealth.

Funding for the scheme is demand-driven, and it changes to match the actual level of eligible passenger vehicle travel undertaken. Funding for 1996/97 was originally estimated at $7.5m based upon the carriage of an estimated 68 000 passenger vehicles during the first 10 months of the Scheme's operation. A total of nearly $8.5m in rebates was paid during 1996/97 in respect of the carriage of 73 360 passenger vehicles. Funding for 1997/98 was further increased to $10.9m in the 1997/98 Budget in respect of the carriage of some 93 000 passenger vehicles. With increased demand on the *Spirit of Tasmania* and TT Line providing an additional daily service during the 1997/98 peak season using Incat's *Devil Cat*, the approved funding for 1997/98 was increased to $12.8m in respect of the carriage of some 113 000 passenger vehicles.

New operators

The Scheme does not discriminate between service operators. Should a new operator enter the Bass Strait passenger trade, the Scheme applies to its passengers on the same basis as those of existing service operators. That is, the rebate applicable to each season, and the dates of the seasons,

TABLE 5 ROUND TRIP REBATE FOR A DRIVER TRAVELLING WITH A MOTOR CAR, BUS, OR MOTOR CYCLE, 1 SEPTEMBER 1996 TO 30 JUNE 1997

	Off peak season 1 Sep 96 – 27 Sep 96 13 Apr 97 – 30 Jun 97	Shoulder season 28 Sep 96 – 13 Dec 96 26 Jan 97 – 12 Apr 97	High season 14 Dec 96 – 25 Jan 97
Eligible vehicle			
Motor car or bus	$200	$240	$300
Motor cycle	$100	$120	$150

Note *The rebate for a one-way trip is 50 per cent of the rebate for a round trip. Where a round trip consists of northbound and southbound legs in different seasons, the booking is, for the purposes of determining a rebate, considered as consisting of two one-way trips.*

Source *DoTRD 1996.*

remain unchanged for any new operator. This arrangement is intended to provide some certainty in the marketplace as to how the Scheme will apply.

Payment made under the scheme

During the monitoring period, there were two operators carrying passengers and their vehicles between Tasmania and the mainland: TT Line with the *Spirit of Tasmania*; and Southern Shipping with the much smaller ferry *Matthew Flinders*. The *Spirit of Tasmania* operates between Devonport and Melbourne, while the *Matthew Flinders* operates services between Bridport (Tasmania) and Welshpool (Victoria) via Flinders and Deal Islands. Since eligible passengers using Southern Shipping received rebates totalling only $1080 over the monitoring period, the BTE report focused on the operations of TT Line.

For the period September 1996 to June 1997, $8.47 million was paid by the Commonwealth to TT Line, for 73 360 eligible passenger vehicles. Of these vehicles, the vast majority (95 per cent) were motor cars, 4.5 per cent were motor cycles and less than one per cent were buses.

The effectiveness of the scheme

A discussion regarding the effectiveness of the Scheme is contained within the report. In conclusion, though, the monitoring report found that, due to the limited period over which the Scheme had operated, it was too early to draw any firm conclusions about the effectiveness of the Bass Strait Passenger Vehicle Equalisation Scheme. Nevertheless, the following points were worth mentioning:

- there has been an increase in total traffic on the *Spirit of Tasmania* since the commencement of the Scheme;
- load factors (per voyage) increased, resulting in lower unit costs for TT Line; and
- unit passenger revenues remained roughly unchanged, while unit vehicle revenues increased by 5.5 per cent.

The report found that there was little doubt that the introduction of the Scheme had contributed to the improved financial performance of TT Line, notwithstanding that TT Line may have passed on some of the indirect benefits it derived from the Scheme through increased discounting during the off peak season.

Postscript

It does seem that the increase in demand has been sustained beyond the 1996/97 monitoring period. During the scheduled dry docking of the *Spirit of Tasmania*, the ferry *Incat 045* operated between 13 July and 27 July 1997 (inclusive). This service enabled TT Line to trial the potential use of a high-speed catamaran, resulting in TT Line's decision to provide a high-speed service over the peak 1997/98 period, and its intention to do so again in the 1998/99 peak season.

CREW TO BERTH RATIOS

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship(s) operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 7 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the BTE is still auditing the data, the March quarter 1998 merchant shipping data in this issue of *Waterline* are classified as preliminary.

The *crew to berth ratio* for merchant shipping was 2.104 in the March quarter, compared with 2.123 in the December 1997 quarter, and below the initial level of 2.133 in the September quarter 1993.

Table 6 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the March quarter. *Ship time* is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio was 1.032 in the March quarter, compared with 1.028 in the previous quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave,

FIGURE 7 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

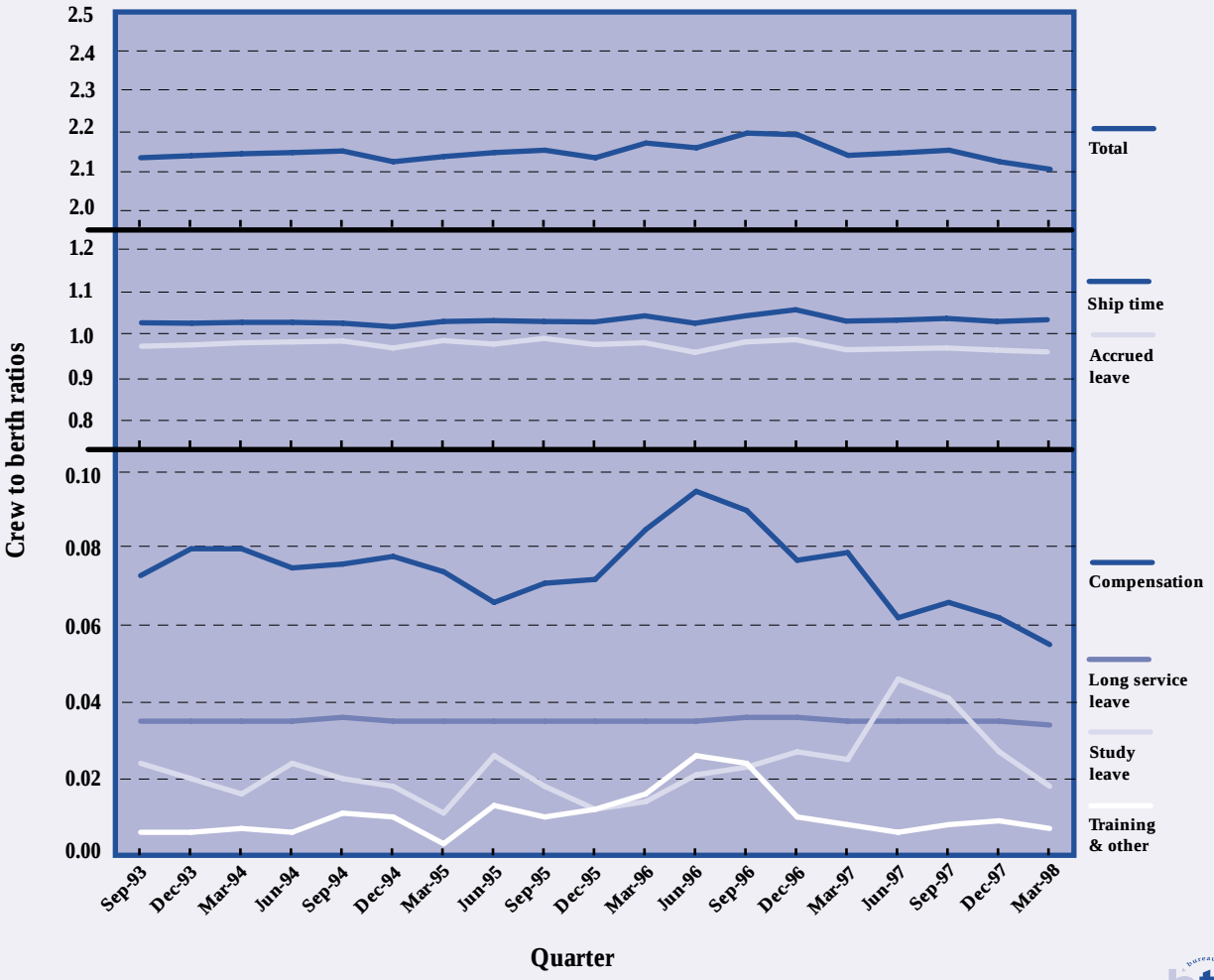


TABLE 6 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, MARCH QUARTER 1998[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.053	0.984	0.019	0.035	0.025	0.018	2.134
Engineers	1.041	0.972	0.041	0.035	0.053	0.009	2.151
All officers	1.047	0.978	0.030	0.035	0.040	0.014	2.143
Integrated ratings	1.017	0.943	0.081	0.034	0.000	0.001	2.075
Catering crew	1.025	0.942	0.064	0.034	0.000	0.001	2.066
All ratings	1.019	0.943	0.076	0.034	0.000	0.001	2.072
All crew	1.032	0.958	0.055	0.034	0.018	0.007	2.104
Previous quarter	1.028	0.962	0.062	0.035	0.027	0.009	2.123
Initial level[b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for September quarter 1993.

Source Data provided by ship operators.

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

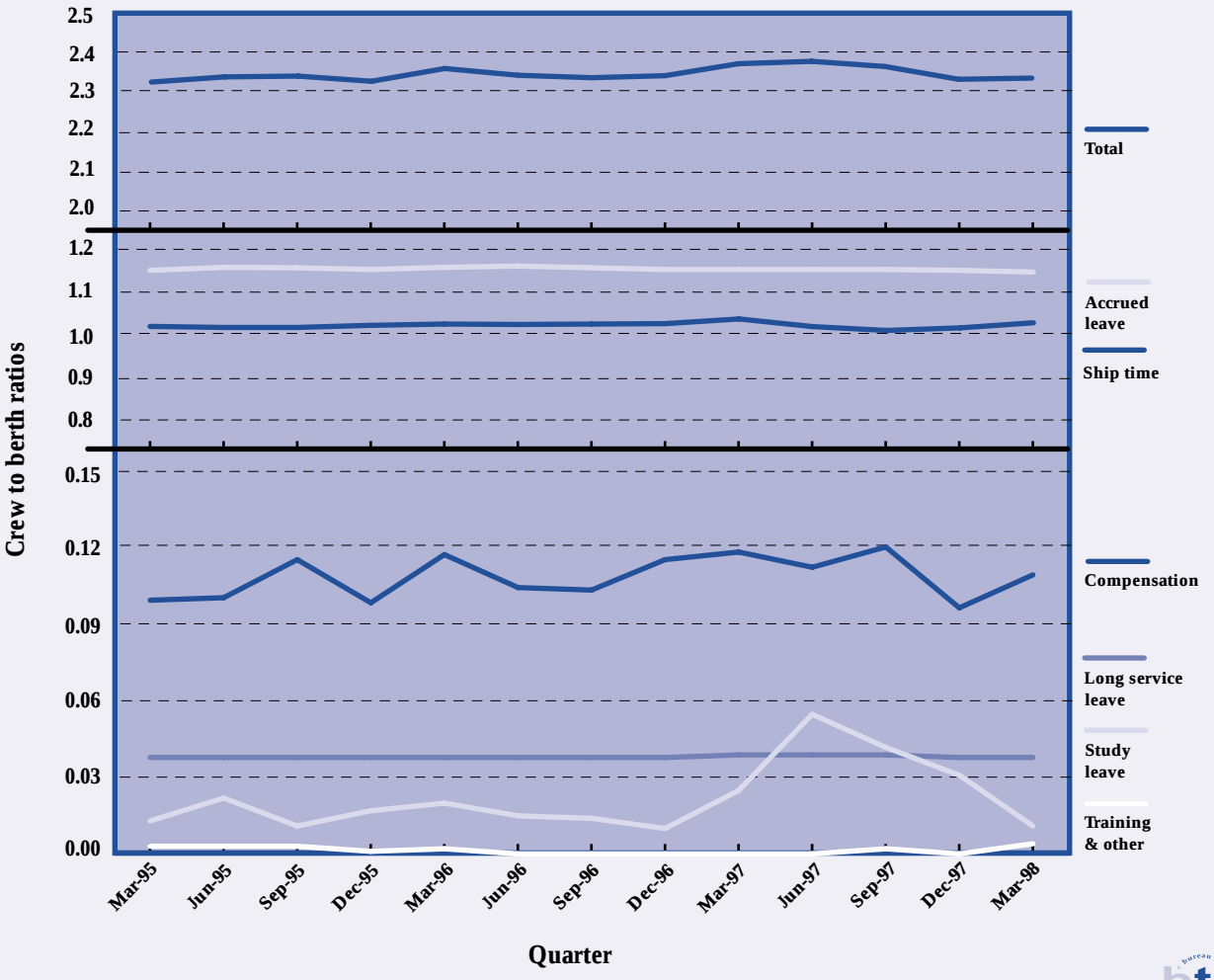


TABLE 7 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, MARCH QUARTER 1998[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.043	1.153	0.040	0.038	0.031	0.004	2.310
Engineers	1.017	1.153	0.026	0.037	0.014	0.004	2.251
All officers	1.030	1.153	0.033	0.037	0.022	0.004	2.280
Integrated ratings	1.020	1.138	0.147	0.038	0.000	0.002	2.347
Catering crew	1.055	1.153	0.364	0.043	0.000	0.010	2.625
All ratings	1.026	1.141	0.179	0.039	0.000	0.003	2.388
All crew	1.028	1.147	0.110	0.038	0.011	0.004	2.337
Previous quarter	1.016	1.151	0.097	0.038	0.031	0.000	2.334
Initial level[b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for March quarter 1995.

Source Data provided by ship operators.

compassionate leave and leave in lieu of a 35 hour week. The accrued leave ratio was 0.958 in the March quarter, compared with 0.962 in the December quarter.

Other changes in the components of the merchant shipping crew to berth ratio were:

- *Compensation leave* fell to 0.055 in the March quarter, from 0.062 in the previous quarter;
- *Study leave* fell to 0.018 in the March quarter, down from 0.027 in the previous quarter; and
- *Training and other paid leave* was 0.007 in the March quarter, compared with 0.009 in the December quarter 1997.
- *The long service leave* ratio for merchant shipping in the March quarter was 0.034, a reduction of 0.001 from the previous quarter.

Offshore shipping

Figure 8 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. As the BTE is still auditing the data, the March quarter 1998 offshore shipping data in this issue of *Waterline* are classified as preliminary.

The crew to berth ratio for offshore shipping was 2.337 in the March quarter, compared with 2.334 in the December quarter 1997, and the initial March quarter 1995 level of 2.327.

Table 7 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the December quarter. *Accrued leave* is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio for the March quarter was 1.147, compared with 1.151 in the December quarter 1997.

Ship time also represents a significant part of the offshore crew to berth ratio, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio for the March quarter was 1.028, compared with 1.016 in the previous quarter.

Other components of the offshore crew to berth ratio were:

- *Compensation leave*, which rose to 0.110, from 0.097 in the previous quarter;
- *Long service leave*, which remained at 0.038;
- *Study leave*, which fell to 0.011, from 0.031 in the previous quarter; and
- *Training and other paid leave*, which rose to 0.004, from the previous quarter's 0.000.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
BTCE	Bureau of Transport and Communications Economics
BTE	Bureau of Transport Economics
DoTRD	Department of Transport and Regional Development
teu	Twenty-foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

Issue number 16 of Waterline is due for release on 30 September 1998

Some recent BTE publications

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Tasmanian freight equalisation scheme: Discussion paper: September 1996
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Transport synergies between eastern Indonesia and northern Australia
(1998) $12.95
Report 97

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TABLE 8 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, DECEMBER QUARTER 1989 TO MARCH QUARTER 1998 —PRODUCTIVITY IN TEUS PER HOUR

	Dec-89	Mar-90	Jun-90	Sep-90	Dec-90	Mar-91	Jun-91	Sep-91	Dec-91	Mar-92	Jun-92	Sep-92	.....	Sep-93	Dec-93
Brisbane															
Ships handled	51	60	63	70	88	75	89	91	91	85	96	93	na	106	111
Total TEUS	25797	26235	24544	27628	32705	23203	33845	38074	36021	28235	39058	45055	na	49622	46529
Crane rate	13.30	12.90	13.60	12.00	12.30	13.30	13.40	14.30	14.90	17.00	18.00	19.80	na	21.24	21.07
Elapsed rate	17.30	16.00	14.80	15.10	15.10	13.40	16.30	16.90	17.80	19.60	21.20	25.60	na	26.57	24.56
Net rate	19.00	17.60	17.40	17.30	17.00	14.50	17.40	18.20	19.60	21.10	22.90	27.40	na	29.38	27.47
Sydney															
Ships handled	93	110	107	108	119	107	114	109	109	105	109	112	na	205	238
Total teus	69290	62793	61153	60257	69975	55012	58075	67601	72250	71702	68359	81287	na	124028	139321
Crane rate	13.30	13.00	13.50	13.20	14.80	14.20	14.10	15.50	17.50	18.60	19.80	20.90	na	19.84	20.44
Elapsed rate	11.90	11.60	14.60	12.40	12.40	14.40	13.60	16.50	18.40	19.90	22.90	24.10	na	22.59	21.96
Net rate	14.40	14.30	16.50	14.60	16.70	16.90	15.50	18.40	22.70	26.30	31.20	30.40	na	29.36	28.33
Melbourne															
Ships handled	106	117	118	132	143	131	117	113	125	108	121	121	na	235	306
Total teus	82612	71825	70253	84043	81978	72632	73921	75427	95019	73441	82757	86486	na	129687	143350
Crane rate	12.40	13.60	14.40	14.60	14.70	15.00	14.10	15.70	14.80	16.70	18.10	19.40	na	22.34	18.95
Elapsed rate	14.10	16.90	17.10	18.00	18.00	18.20	17.00	17.60	18.70	19.20	20.90	22.60	na	25.89	20.01
Net rate	17.20	20.00	20.00	19.90	20.00	20.90	19.80	20.90	20.50	22.10	23.90	24.90	na	29.30	22.89
Adelaide															
Ships handled	23	23	24	18	29	25	19	20	21	22	20	21	na	21	26
Total teus	9295	9461	9389	7516	10971	11572	9402	9442	10998	10810	10710	10763	na	9650	12616
Crane rate	15.80	17.80	17.10	16.20	17.10	16.10	17.70	17.00	18.00	19.80	18.70	19.10	na	19.80	20.90
Elapsed rate	18.70	23.20	20.80	22.30	19.70	21.70	23.20	19.60	25.30	27.20	24.40	25.90	na	23.10	25.50
Net rate	19.30	23.80	22.00	23.30	20.80	23.70	23.70	20.50	25.90	28.20	25.00	27.90	na	26.10	26.60
Fremantle															
Ships handled	69	64	66	72	66	68	74	76	77	71	75	72	na	116	115
Total teus	24380	22362	19411	22339	21567	21205	23696	22713	26522	25403	26572	27690	na	37566	40910
Crane rate	14.00	14.50	13.50	15.50	15.60	15.50	15.80	15.00	16.40	21.00	18.60	20.40	na	19.00	19.82
Elapsed rate	11.80	12.10	11.80	12.40	12.80	12.90	12.90	12.10	13.10	16.80	15.10	18.20	na	13.13	15.54
Net rate	14.70	15.20	14.20	16.30	16.40	16.30	16.60	15.80	16.40	21.00	18.60	21.40	na	19.39	20.98
Five ports															
Ships handled	342	374	378	400	445	406	413	409	423	391	421	419	na	683	796
Total teus	211374	192676	184750	201783	217196	183624	198939	213257	240810	209591	227456	251281	na	350553	382726
Crane rate	13.40	13.50	14.00	13.90	14.50	14.60	14.30	15.40	15.90	18.00	18.70	20.10	na	20.87	19.91
Elapsed rate	13.50	14.20	15.30	15.00	14.90	15.70	15.40	16.40	17.80	19.40	20.70	23.10	na	23.37	20.98
Net rate	16.10	17.00	17.70	17.30	18.00	18.20	17.70	18.90	20.60	23.30	24.70	26.50	na	28.18	25.35

p *provisional*
na *not available*

Note *Elapsed rates and net rates from the March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide), due to changes in a terminal operator's information systems.*

Sources *WIRA, Patrick, P&O Ports and SeaLand.*

TABLE 8 (cont.) CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, DECEMBER QUARTER 1989 TO MARCH QUARTER 1998 —PRODUCTIVITY IN TEUS PER HOUR

	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98
Brisbane																	
Ships handled	112	140	140	187	136	123	135	132	124	133	140	141	156	164	162	177	170
Total teus	37820	52983	51596	50574	41723	47065	58851	46439	39037	51008	66115	62904	47471	65572	73184	71043	58857
Crane rate	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6
Elapsed rate	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9
Net rate	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.4p
Sydney																	
Ships handled	177	240	223	221	218	202	192	203	206	216	228	249	251	249	243	266	238
Total teus	116914	129586	142659	152326	144868	140113	148431	143746	146038	148290	156344	174982	158323	167705	183978	201535	176496
Crane rate	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.5	19.9	20.3	19.6	22.3	22.6	23.5	23.5	22.5
Elapsed rate	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6
Net rate	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	28.0	27.9	29.5	28.9	32.2	32.7	36.1	35.5	33.0p
Melbourne																	
Ships handled	211	265	267	244	265	228	221	227	228	262	274	282	230	249	268	281	276
Total teus	153420	158849	159039	180134	173338	152983	161943	173566	162911	170884	203371	202376	162156	177070	208200	223465	207346
Crane rate	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3
Elapsed rate	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3
Net rate	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.7p
Adelaide																	
Ships handled	28	34	31	33	35	50	34	42	47	63	70	74	69	65	68	66	60
Total teus	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	23351	21963	20933	25982	25188	22260
Crane rate	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5
Elapsed rate	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3
Net rate	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6
Fremantle																	
Ships handled	127	135	121	124	128	136	139	124	143	153	159	161	159	164	166	173	165
Total teus	40587	40986	36635	46969	44388	45308	50050	44662	47597	51113	50791	55593	51784	52092	57903	64243	62922
Crane rate	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5p
Elapsed rate	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na
Net rate	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	28.4p
Five ports																	
Ships handled	655	814	782	809	782	739	721	728	748	827	871	907	865	891	907	963	909
Total teus	361984	394865	403096	445041	421149	407145	433594	425731	411538	440098	497140	519206	441697	483372	549247	585474	527881
Crane rate	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5p
Elapsed rate	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na
Net rate	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.9p

p provisional
na not available

Note Elapsed rates and net rates from the March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide), due to changes in a terminal operator's information systems.

Sources WIRA, Patrick, P&O Ports and SeaLand.

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The BTE is particularly grateful for the assistance of the Maritime Transport Division of the Department of Workplace Relations and Small Business, the Association of Australian Ports and Marine Authorities, ship operators, shipping lines, and the stevedoring companies Patrick, P&O Ports and SeaLand.

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issue number 16 September 1998

The Importance of a Range of Performance Indicators

Observant readers of *Waterline* may be curious about why the June quarter 1998 stevedoring productivity indicators appear to be 'normal' regardless of the dispute involving Patrick and the Maritime Union of Australia (MUA). The answer involves two issues:

- Patrick was unable to provide any meaningful productivity data for the work performed during the dispute and therefore the Patrick June quarter data do not include information relating to the period of the dispute; and

- a significant majority of Patrick's usual business was diverted during the dispute to other terminals operated by stevedores not involved in the dispute.

Even if Patrick had provided productivity data covering the period of the dispute, port average stevedoring performance measures such as those used by the BTE would not necessarily have been affected. This is because the *Waterline* stevedoring productivity measures are partial measures of performance based on the time the ship is being worked (in general), and because only a small number of ships were handled by Patrick during the dispute.

The effect of the dispute can be clearly seen, however, in the BTE's waterfront reliability indicators. Berth availability was down and the time spent by ships waiting for a berth increased in the June quarter, reflecting the congestion caused by the dispute. In addition there was an increase in 'other ship waiting time' directly attributable to waterfront services.

The different effect of the dispute on the productivity and reliability indicators demonstrates the value of having both measures of performance.

Excess Capacity?

The container throughput data contained in this issue of *Waterline* provide some indication of the extent of excess capacity that may exist in the Australian container stevedoring industry.

Using the stevedores' proportion of total container throughput volumes as an approximation of their share of capacity, the dispute involving Patrick and the MUA had the effect of closing down 13 per cent of total Australian stevedoring capacity for the entire June quarter. However, total Australian container throughput for the June quarter 1998 was down only 3.5 per cent on the previous quarter and was up 5.1 per cent on the June quarter 1997.

Obviously this is not a rigorous analysis and the distribution of excess capacity is not uniform across Australia. However, the way in which the Australian container transport system adapted to a significant disruption in capacity during the June quarter raises some doubt regarding the strength of the argument for further container terminal investment in Australia based on the grounds of capacity shortages. Future labour productivity improvements would weaken that argument even further.

STEVEDORING PRODUCTIVITY

Table 1 presents the September 1996 to June 1998 indicators of stevedoring productivity for the major Australian container terminals, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December 1995 to June 1998 period. The data for Brisbane, Sydney, Melbourne and Fremantle are averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal.

Please note that:

- the June quarter 1998 data cover the 8 April to 7 May 1998 period of industrial disputation involving Patrick and the MUA. Patrick was unable to provide any performance data for this period.
- Fremantle elapsed rate data from one operator are not available and therefore only a four-port average indicator could be calculated. However, given that the five-port average is dominated by Melbourne and Sydney, the four-port figure calculated is a reasonable approximation of the five-port average.

Overall national stevedoring productivity, as measured by the five-port average, changed little in the June quarter compared with the March quarter:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 18.7 containers per hour for the June quarter compared with 18.8 in the March quarter;
- the four-port (Fremantle data not available) average *elapsed rate* (productivity *per ship* based on the time labour is aboard the ship) was 20.7 containers per hour compared with 20.0 in the March quarter; and
- the five-port average net rate (productivity *per ship* while the ship is worked) was 24.7 containers per hour compared with 23.4 containers (revised) in the March quarter.

Brisbane average crane rates were 17.3 containers per hour in the June quarter, down from 18.0 in the March quarter. The average elapsed rate was 17.1 containers per hour compared with 16.4 in the March quarter. The net rate of 20.2 containers per hour was up from 19.1 containers per hour (revised) for the March quarter. The average proportion of elapsed time not worked increased to 15.4 per cent.

Sydney average crane rates were 16.9 containers per hour in the June quarter, down from 17.5 in the March quarter. The June quarter elapsed and net rates increased to 20.2 containers per hour and 26.2 containers per hour respectively. The average proportion of elapsed time not worked increased to 22.9 per cent.

Melbourne average crane rates were 19.2 containers per hour in the June quarter, down marginally from 19.5 in the March quarter. The elapsed rate of 21.0 containers per hour and the net rate of 24.2 containers per hour were up on the previous quarter's figures. Elapsed time not worked increased to 13.3 per cent.

Adelaide average crane rates continued their upward trend, achieving 23.1 containers per hour in the June quarter, compared with 22.5 in the March quarter. The Adelaide elapsed rate of 30.4 containers per hour and the net rate of 31.5 containers per hour were both up on the March quarter rates. The

average proportion of elapsed time not worked remained almost constant at 3.5 per cent.

Fremantle average crane rates were 21.5 containers per hour in the June quarter, up from 19.6 containers per hour in the March quarter. The elapsed data for March are not available from one operator and therefore the elapsed rate for Fremantle has not been produced for this quarter. The net rate of 23.9 containers per hour was up on the March quarter rate.

Teus per hour

Table 11 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purposes of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.

Container port activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The June quarter 1998 five-port average showed a 7.0 per cent decrease in ship visits and a 3.5 per cent decrease in container throughput when compared with the previous quarter. Compared with the June quarter of the previous year the five-port average for container ship visits fell by 5.2 per cent while the five-port average for container throughput rose by 5.1 per cent.

On a port by port basis, the June quarter 1998 container exchange at:

- Brisbane was up 19.8 per cent on the March quarter figure, and up 12.0 per cent compared with the June quarter 1997;
- Sydney was down 5.2 per cent on the March quarter figure, and down 0.4 per cent compared with the June quarter 1997;
- Melbourne was down 11.5 per cent on the March quarter figure, but up 2.4 per cent compared with the June quarter 1997;
- Adelaide was up 28.2 per cent on the March quarter 1998 figure and up 38.0 per cent compared with the June quarter 1997. The large increase in container exchange at Adelaide resulted predominantly from the industrial dispute during April and May. The impact of the dispute on the container ports at Sydney and Melbourne resulted in a number of vessels exchanging their Sydney and Melbourne containers at Adelaide instead; and
- Fremantle was down 6.8 per cent on the March quarter figure, but up 9.3 per cent compared with the June quarter 1997.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS–PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter							
Port/indicator	Sep–96	Dec–96	Mar–97	Jun–97	Sep–97	Dec–97	Mar–98	Jun–98
Five ports								
Ships handled	871	997	865	891	997	963	999	845
Total containers	400201	416977	357848	387277	431853	467122	421769	406938
Crane rate	18.0	17.1	18.4	18.3	18.3	18.5	18.8	18.7
Elapsed rate	19.0	na	18.6	19.0	20.4	20.5	20.0 a	20.7 a
Net rate	23.5	21.8	23.4	23.6	24.3	24.3	23.4 r	24.7
Elapsed time not worked (per cent)	19.1	na	20.3	19.2	16.2	15.7	15.5 a	16.2 a
Brisbane								
Ships handled	140	141	156	164	162	177	170	168
Total containers	53690	51815	40696	52610	58424	58014	49197	58939
Crane rate	16.5	16.9	17.3	16.4	16.1	16.8	18.0	17.3
Elapsed rate	17.2	17.4	17.3	16.6	16.8	16.8	16.4	17.1
Net rate	20.4	20.4	19.4	18.7	19.1	19.6	19.1 r	20.2
Elapsed time not worked (per cent)	15.7	15.0	10.8	11.5	11.7	14.6	13.9 r	15.4
Sydney								
Ships handled	228	249	251	249	243	266	238	219
Total containers	123390	137542	126265	131004	142659	157430	137600	130513
Crane rate	16.1	15.4	17.7	17.7	18.2	18.4	17.5	16.9
Elapsed rate	18.2	na	18.2	18.5	21.7	21.9	19.9	20.2
Net rate	23.3	22.7	25.7	25.5	27.9	27.7	25.7	26.2
Elapsed time not worked (per cent)	21.9	na	29.4	27.6	22.4	20.7	22.5	22.9
Melbourne								
Ships handled	274	282	230	249	268	281	276	234
Total containers	163297	161865	130459	143708	162591	178302	166284	147122
Crane rate	19.6	17.8	19.0	19.0	18.6	18.8	19.5	19.2
Elapsed rate	21.1	17.9	19.5	20.3	20.5	19.9	20.1	21.0
Net rate	25.6	21.7	23.0	24.0	23.5	22.6	22.7 r	24.2
Elapsed time not worked (per cent)	17.6	17.8	15.3	15.4	13.0	11.9	11.8	13.3
Adelaide								
Ships handled	70	74	69	65	68	66	69	66
Total containers	17415	19047	17486	16874	20974	20773	18163	23293
Crane rate	19.3	19.6	19.6	21.0	21.1	21.4	22.5	23.1
Elapsed rate	22.2	22.6	24.0	28.3	28.4	29.2	29.6	30.4
Net rate	22.8	23.1	24.6	29.1	29.2	30.1	30.7	31.5
Elapsed time not worked (per cent)	2.6	2.2	2.4	2.7	2.7	3.0	3.6	3.5
Fremantle								
Ships handled	159	161	159	164	166	173	165	158
Total containers	42409	46707	42942	43081	47205	52603	50525	47071
Crane rate	17.8	18.2	19.4	19.0	18.8	18.9	19.6	21.5
Elapsed rate	13.4	15.6	16.2	15.9	17.0	18.9	na	na
Net rate	19.4	20.5	20.6	19.8	20.6	23.2	21.1 r	23.9
Elapsed time not worked (per cent)	30.9	23.9	21.5	19.5	17.6	18.4	na	na

na not available
r revised
a Four-port average only as Fremantle elapsed rate data are not available.

Notes
1 The June quarter 1998 figures do not include data for Patrick covering 8 April to 7 May 1998, during which time the company was involved in a major industrial dispute with the MUA.
2 Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator s information systems.
3 The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 11.
4 Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.

Sources Patrick, P&O Ports and Sea-Land.

FIGURE 1 FIVE MAJOR PORTS

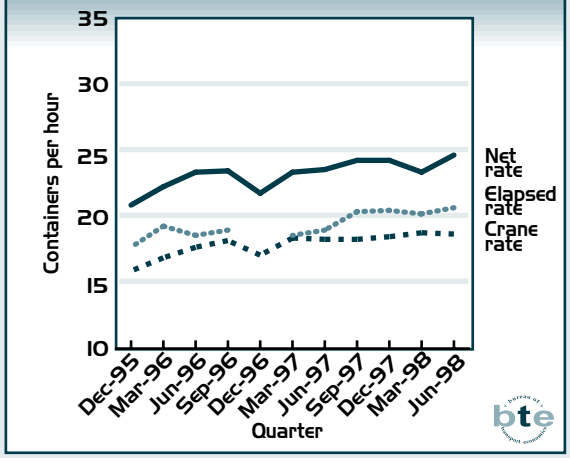


FIGURE 2 BRISBANE

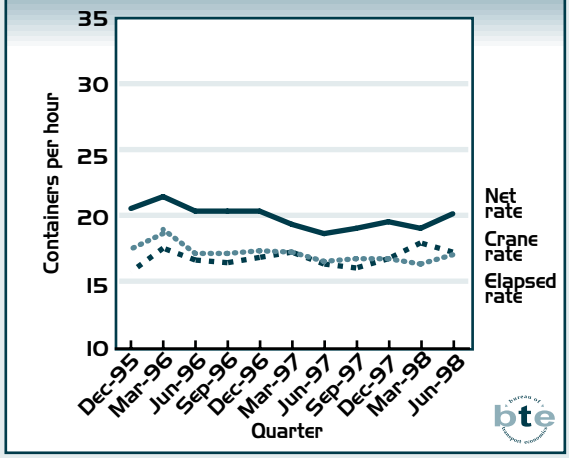


FIGURE 3 SYDNEY

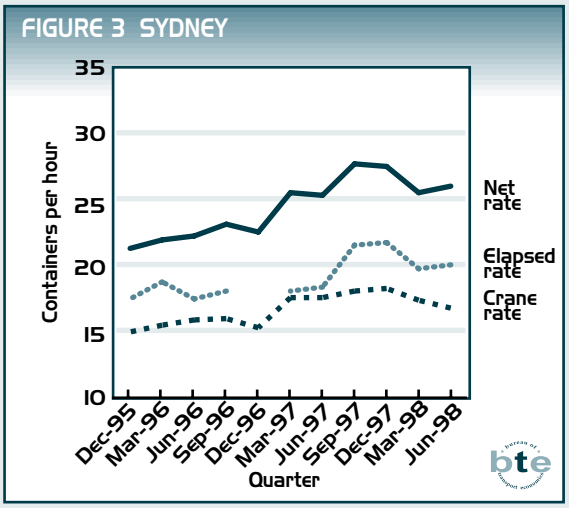


FIGURE 4 MELBOURNE

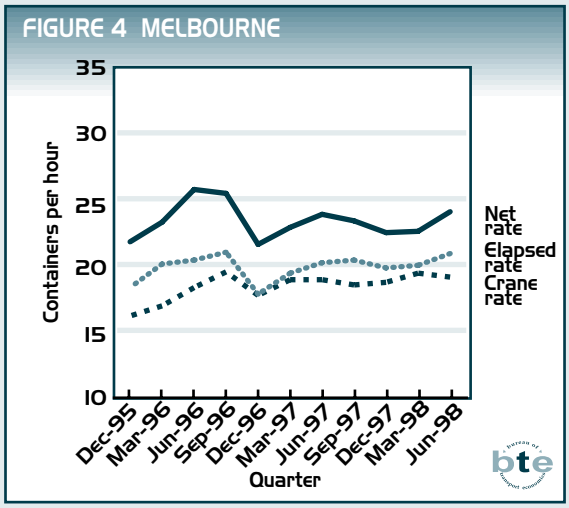


FIGURE 5 ADELAIDE

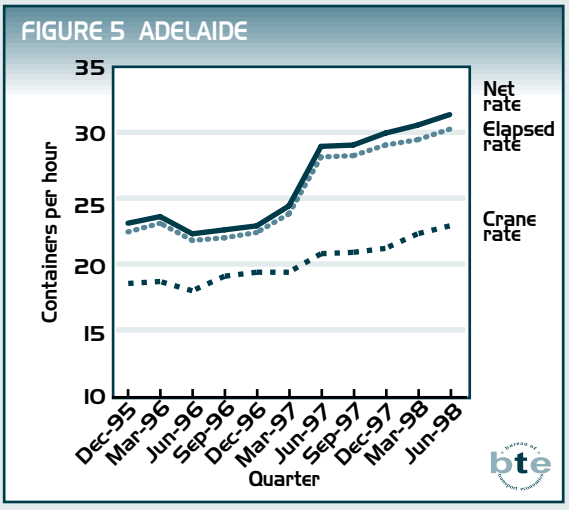
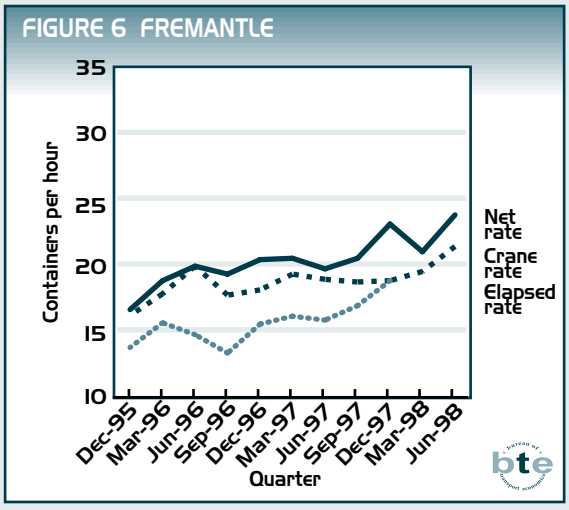


FIGURE 6 FREMANTLE



Note *Elapsed rates and net rates from the March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.*

Sources *Patrick, P&O Ports and Sea-Land.*

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the June quarter 1998. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, JUNE QUARTER 1998

(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5-10	11-20	>20	Total no. of ship calls
Brisbane									
Berth availability	29	0	0	0	0	4	4	2	39
Pilotage	39	0	0	0	0	0	0	0	39
Towage	39	0	0	0	0	0	0	0	39
Sydney									
Berth availability	39	1	1	0	0	5	14	14	74
Pilotage	74	0	0	0	0	0	0	0	74
Towage	74	0	0	0	0	0	0	0	74
Melbourne									
Berth availability	46	0	0	0	0	3	12	20	81
Pilotage	80	1	0	0	0	0	0	0	81
Towage	81	0	0	0	0	0	0	0	81
Adelaide									
Berth availability	20	0	0	0	0	0	4	2	26
Pilotage	26	0	0	0	0	0	0	0	26
Towage	26	0	0	0	0	0	0	0	26
Fremantle									
Berth availability	51	0	1	0	0	1	1	1	55
Pilotage	55	0	0	0	0	0	0	0	55
Towage	55	0	0	0	0	0	0	0	55
Five ports									
Berth availability	185	1	2	0	0	13	35	39	275
Pilotage	274	1	0	0	0	0	0	0	275
Towage	275	0	0	0	0	0	0	0	275

Note Data for individual ports should be interpreted with caution as there is significant inter-port variation in factors such as sample sizes and ship call patterns.

Source Data for a sample of ship calls provided by shipping lines.

The sample for the June quarter covers 275 ship calls, equivalent to 33 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 23 per cent at Brisbane to 39 per cent at Adelaide.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 68 per cent in the June quarter 1998, down from 88 per cent in the March quarter 1998. Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time increased to 34 hours, from 18 hours in the previous period.

The June quarter 1998 figure was the lowest level for berth availability since this indicator was first prepared by the BTE in the March quarter 1997. The previous lowest figure was 84 per cent, recorded in the December quarter 1997.

The decline in berth availability in the June quarter 1998 reflects the impact of the dispute involving Patrick and the MUA. The data for the March and June quarters indicate that berth availability fell significantly at most ports. Caution should be used in undertaking inter-port comparisons of berth availability as there is significant variation between ports in sample sizes and ship call patterns.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportions were unchanged at 100 per cent in the June quarter 1998.

Other waiting time

The nine shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments (for example, instances where the shipping line holds the ship off the port or at the berth in order to maintain the fixed-day schedule).

In the June quarter, 53 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. This was similar to the proportion of 51 per cent recorded in the March quarter 1998. Both of these figures were significantly higher than the proportions of around 40 per cent that were recorded in the second half of 1997. The average duration of other waiting time incidents was 9.3 hours per incident in the June quarter 1998, up from 7.9 hours per incident in the March quarter 1998.

Table 3 summarises the data on other waiting time incidents in the June quarter 1998. The shipping lines identified a total of 200 incidents (affecting 146 ship calls) for the sample of ship calls over this period. One quarter of the ship calls that incurred other waiting time were affected by two or more incidents.

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, JUNE QUARTER 1998

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5-10	11-20	>20	Total no. of incidents
Awaiting labour	4	6	6	2	13	11	4	46
Stevedoring finished early	7	10	10	5	4	0	0	36
Stevedoring finished late	1	1	4	0	12	11	4	33
Crane breakdown	9	5	1	1	1	0	0	17
Industrial action	1	3	0	0	3	2	6	15
Pilot/tug booking not at preferred time	0	4	2	2	1	1	0	10
Early ship arrival	2	1	1	0	2	1	1	8
Late ship arrival	2	0	0	1	0	3	2	8
Closed port - holidays	0	0	1	0	0	3	2	6
Ship repairs or maintenance	1	1	1	0	1	1	0	5
Weather or tides	0	3	0	0	2	0	0	5
Awaiting cargo or late cargo changes	0	1	1	0	1	1	0	4
Other	2	0	1	0	0	3	1	7
Total incidents	29	35	28	11	40	37	20	200[a]

a These incidents affected 146 of the 275 ship calls covered in table 2.
Source Data for a sample of ship calls provided by shipping lines.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. In the June quarter 1998, four incident types accounted for around three-quarters of the total hours attributable to other ship waiting time:

- Awaiting labour (22 per cent);
- Stevedoring finished late (21 per cent);
- Industrial action (20 per cent);
- Late ship arrival (11 per cent).

Around 73 per cent of the total hours attributable to other waiting time in the June quarter 1998 directly involved waterfront services (mainly items 1 to 6 in table 3). The corresponding figure for the March quarter 1998 was 51 per cent. Around 16 per cent of other waiting time (32 per cent in the previous quarter) directly involved ship operations (early/late ship arrival and repairs/maintenance).

Stevedoring

Table 4 presents the available information on three aspects of stevedoring reliability at the major container terminals – stevedoring completion, stevedoring rate and cargo receival. Data are not available for Fremantle.

Stevedoring completion provides a partial indicator of the accuracy with which stevedoring time is predicted. Data are not available for the June quarter 1998.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The stevedoring rate indicator ranged from 57 per cent to 60 per cent at the three ports for which data are available in the June quarter 1998. Compared with the March quarter 1998, the indicator increased at Brisbane and declined at Sydney and Melbourne.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container terminal performance. In the June quarter 1998, cargo receival ranged between 93 per cent and 97 per cent at the three ports for which data are available.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice. The accuracy of this advice generally improved in the June quarter 1998.

The first indicator of ship arrival advice is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation *at 24 hours prior to actual arrival*. The proportion at the four ports for which data are available ranged between 46 per cent and 70 per cent in the June quarter 1998.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. The proportion ranged between 90 per cent and 100 per cent in the June quarter 1998.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, MARCH AND JUNE QUARTERS 1998

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun
Stevedoring										
Stevedoring completion	60	na	28	na	na	na	na	na	na	na
Stevedoring rate	48	60	61	58	63	57	na	na	na	na
Cargo receival	93	97	82	93	93	94	na	na	na	na
Ship arrival										
Advice at 24 hrs	60	70	51	46	na	na	43[a]	57	56	57
Advice inside 24 hrs	94	100	91	92	na	na	94	95	93	90

na not available
a Low figure for Adelaide is reportedly attributable to industrial issues at other ports.

Sources AAPMA, Patrick and P&O Ports.

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs (charges) for containers moved through the Australian mainland capital city ports. Data for the periods January–June 1998 and July–December 1997 are presented in tables 5 to 7. 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. The indicative approach was adopted because of the difficulty of obtaining data on the multitude of factors affecting the prices charged by each service provider, particularly for towage and road transport charges, and customs brokers' fees.

Port and related charges

Table 5 provides the cost parameters used to determine the port and related charges in table 6. These cost parameters relate to a representative port call by a containership (Lloyd's ship classification UCC). The representative ship is selected from the ship size range which had the most port calls from UCC type ships during the particular period. The other cost parameters are then determined by taking the mean of all port calls in the range that contains the representative ship. Typically, the ship size range of 15 001 to 20 000 GRT has had the most port calls at each port.

It is important to directly connect the mean number of teus exchanged per port call with the size of the representative ship. This is because most port and related charges, particularly towage and port authority tonnage charges, are dependent upon the size of the ship. However, shipping economics are such that, the larger the ship being used to transport the cargo, the more likely ship operators are to attempt to exchange higher amounts of cargo per port call. As a result, the per unit (teu) cost of exchanging cargo at a particular port remains roughly the same for each port call regardless of the size of the ship. It is for this reason that comparative port charge analyses that keep the cargo exchange constant while varying the ship size are misleading. A discussion of this, in relation to the Port Interface Cost Index, can be found in *Waterline 4*, October 1995, pp. 9–13. That article also demonstrates that the BTE's Port Interface Cost Index is a reasonable

TABLE 5 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1997/1998

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
Teus exchanged[a]										
Total	492	347	818	719	724	662	239	327	366 r	330
Loaded	308	273	680	578	607	553	187	260	302 r	265
Empty	94	74	138	141	117	109	52	67	64 r	65
Loaded inwards	139	126	419	358	324	290	74	114	163 r	139
Loaded outwards	169	147	261	220	283	263	113	146	139 r	126
Ship call parameters[a]										
Number of port calls	4	3	3	3	3	3	4	3	6	5
Elapsed berth time (hrs)	24.3	24.1	38.6	36.9	36.2	32.8	11.3	14.8	18.7 r	16.3

r revised
a Mean value for ships between 15 000 and 20 000 GRT.

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

approximation of port interface costs for most container movements across the Australian mainland capital city ports.

Table 6 provides the port and related charges at the five mainland capital city ports for the periods July–December 1997 and January–June 1998. Port and related charges comprise ship-based charges and cargo-based charges.

Ship-based charges

On a per teu basis, ship-based port and related charges rose at Brisbane, Sydney, Melbourne and Fremantle but fell at Adelaide in the January–June 1998 period. This outcome is mainly the result of a decrease in the mean number of teus exchanged per port call at Brisbane, Sydney, Melbourne and Fremantle and a substantial increase at Adelaide. However, changes in the average number of port calls made by the indicative vessel during the period and changes in the elapsed berth time also impacted on the charges to a minor extent in some ports.

Only at Brisbane was there any actual change in ship-based charges; a 10 cents per teu (2 per cent) rise in mooring and unmooring charges. However, on a per ship call basis, this resulted in only a marginal increase (0.2 per cent) in total ship-based charges.

At Melbourne, Adelaide and Fremantle, changes in the parameters upon which the ship-based charges are calculated rather than changes to any actual charge resulted in changes in ship-based charges. At Melbourne the cost of berth hire is based on the elapsed berth time which decreased by 9 per cent on average, with the result that total ship-based charges per ship visit decreased by 3 per cent. At Adelaide tonnage costs increase with the time the ship stays at the berth, measured as elapsed berth time, and conservancy costs (navigation

TABLE 6 PORT AND RELATED CHARGES, 1997/1998

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998
Ship-based charges ($/teu)										
Conservancy	5.56	6.45	-	-	-	-	5.03	4.60	1.44 r	2.49
Tonnage	-	-	8.21 r	9.34	8.44	9.23	14.41	11.34	6.91 r	7.68
Pilotage	12.75	14.78	4.16	4.73	7.57	8.29	9.83	7.19	5.71 r	6.34
Towage	25.15	29.17	11.95	13.59	10.15	11.10	51.47	37.63	26.88 r	29.86
Mooring, unmooring	4.15	4.93	3.85	4.38	1.38	1.51	-	-	3.00 r	3.34
Berth hire [a]	-	-	-	-	11.95	11.84	-	-	-	-
Total [b]	47.61	55.33	28.17 r	32.03	39.49	41.97	80.75	60.76	43.94 r	49.62
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	34.30	34.30	53.00	53.00	47.30	47.30
Exports	26.00	26.00	45.00	45.00	34.30	34.30	53.00	53.00	47.30	47.30
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	13.90	13.90
Total port and related charges ($/teu) [b]										
Loaded imports	115.61	123.33	88.17r	92.03	73.79	76.27	133.75	113.76	105.14	110.82
Loaded exports	115.61	123.33	73.17r	77.03	73.79	76.27	133.75	113.76	105.14	110.82
Charges per ship visit ($/visit)										
Total ship-based charges	19157	19197	23036r	23036	28599	27786	19296	19860	16088	16352
Empty teus [c]	1340	1055	1380	1410	1168	1088	0	0	493 r	501

- not applicable
r revised
a Charged by stevedores and itemised separately from basic stevedoring charge.
b Components may not sum to totals due to rounding.
c 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 5.

Sources BTE 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.

service charge) decrease with a rise in the number of ship visits within each 6 month period. On average, elapsed berth time at Adelaide rose by 31 per cent in the January–June 1998 period while the number of ship visits fell by 28 per cent. Together these produced a 3 per cent rise in total ship-based charges per ship visit. Finally, at Fremantle the conservancy cost depends upon the number of ship visits within each 2 month period. An average 12 per cent reduction in ship visits produced an increase of 2 per cent in total ship-based charges per ship visit.

While caution should always be used when making port comparisons on a per teu basis, Sydney remains the lowest cost port for ship-based charges. This is significant from a cargo owner's point of view. However, Sydney maintains this position as a direct result of the substantially larger number of teus exchanged per port call. From the point of view of ship operators using ships similar to the representative ship in table 5, Fremantle remains the lowest cost port for ship-based charges on a per ship visit basis.

Cargo-based charges

There were no changes in port and related cargo-based charges at any of the five ports in the January–June 1998 period.

Changes in total port and related charges per teu

At Brisbane, on a per teu basis, total port and related charges rose 7 per cent for both loaded imports and loaded exports for the period January–June 1998. As the change in the mooring and unmooring charge effected only an insignificant increase in cost, the 7 per cent rise is almost entirely the result of the 14 per cent drop in the mean teu exchange for the period.

At Sydney, on a per teu basis, total port and related charges rose about 5 per cent for loaded imports and loaded exports in the January–June 1998 period. As there were no changes in any of the port and related costs at Sydney during this period, this increase demonstrates the impact a 12 per cent decrease in the mean teu exchange can have upon the per unit charge.

At Melbourne, on a per teu basis, total port and related charges rose 3 per cent for loaded imports and loaded exports for the period January–June 1998. This increase was the result of a decrease (9 per cent) in the mean teu exchange per port call, outweighing the effect of a decrease in the time the vessel remained alongside the berth.

At Adelaide, on a per teu basis, total port and related charges fell 15 per cent for loaded imports and loaded exports in the January–June 1998 period. This decrease was the result of a substantial increase (37 per cent) in the mean teu exchange.

At Fremantle, on a per teu basis, total port and related charges rose 5 per cent for loaded imports and loaded exports in the January–June 1998 period. This increase was the result of a decrease (10 per cent) in the mean teu exchange per port call, together with a decrease in the average number of port calls per ship during the period.

Stevedoring charges per teu

The last ACCC survey of container terminal operations provided a provisional estimate of stevedoring charges of $203 per teu in 1995. For the January–June 1997 period, the BTE contacted a range of shipping lines and terminal operators in an interim attempt to obtain more recent estimates for container stevedoring charges. As a result, it was estimated that average revenue for container

stevedoring was 7.5 per cent, or $15 per teu lower than the ACCC's provisional 1995 estimate. This led to a provisional stevedoring charge of $188 being used for the Port Interface Cost Index.

The BTE is still working to obtain detailed data to provide a more robust estimate of stevedoring charges. In the meantime, based on the opinions of reliable shipping industry sources that suggest stevedoring charges have remained reasonably static over the past 12 months, the previous estimate of $188 has been used again as the provisional estimate for the January–June 1998 period.

Land-based charges per teu

The average charges for customs brokers' fees and road transport charges for the July–December 1997 and January–June 1998 Port Interface Cost Index are included in table 7. These charges are based on data provided by approximately 40 customs brokers and 50 road transport operators. Customs brokers' fees for imports are higher than the fee for exports, reflecting the more complex clearance procedures for import containers.

The January–June 1998 period indicated little movement in customs brokers' fees in the five ports. A two per cent decrease in the fee for imports at Fremantle and a two per cent decrease in the fee for exports at Brisbane were the only changes exceeding one per cent.

Similarly, there was little movement in average road transport charges in the January–June 1998 period, with a 3 per cent increase at Brisbane being the only change in excess of one per cent. One of the parameters used to estimate road transport charges is the time taken to move containers from (to) the wharf to (from) the customer's warehouse. Both distance and traffic congestion impact upon this parameter and help explain, to some extent, the significant difference

TABLE 7 PORT INTERFACE COSTS, 1997/1998

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998
Imports										
Ship-based charges	48	55	28 r	32	39	42	81	61	44r	50
Cargo-based charges	68	68	60	60	34	34	53	53	61	61
Stevedoring p	188	188	188	188	188	188	188	188	188	188
Customs brokers fees	123	123	154	152	138	138	131	131	145	143
Road transport charges	179	185	288	288	252	251	157	158	194	195
Total imports a	606	620	718	719	651	653	610	591	632	637
Exports										
Ship-based charges	48	55	28 r	32	39	42	81	61	44r	50
Cargo-based charges	68	68	45	45	34	34	53	53	61	61
Stevedoring p	188	188	188	188	188	188	188	188	188	188
Customs brokers fees	78	77	110	111	89	89	71	71	70	70
Road transport charges	179	185	288	288	252	251	157	158	194	195
Total exports a	561	574	659	663	602	604	551	532	557r	564

p provisional pending updating of stevedoring charge using detailed survey data
r revised
a Components may not sum to totals due to rounding.

Notes
1 Based on parameters described in table 5.
2 Waterline data on customs brokers fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.
3 The stevedoring charge used in Waterline is a weighted average for several major Australian ports. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTE 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; and stevedoring charges data supplied by the ACCC and industry sources.

between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

Indices for individual ports

Table 7 indicates that, with the exception of Adelaide, port interface costs increased marginally at all Australian mainland capital city ports between July–December 1997 and January–June 1998. Port interface costs rose by 2 per cent at Brisbane, by less than 1 per cent at Sydney and Melbourne, and by 1 per cent at Fremantle. In Adelaide port interface costs fell by 3 per cent.

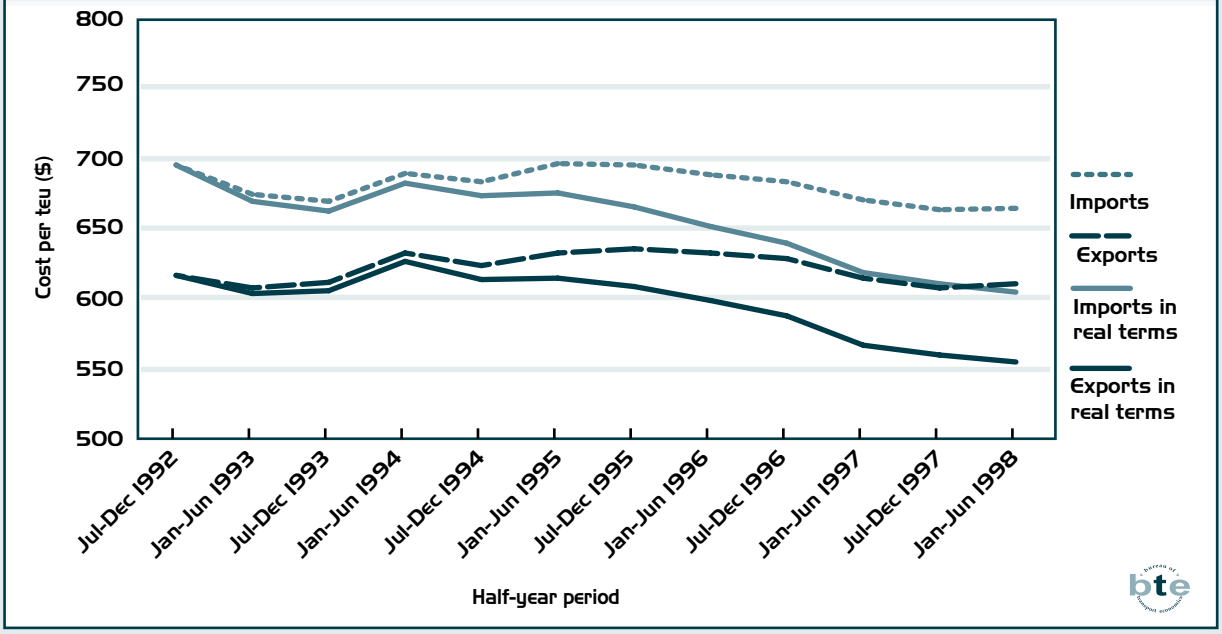
However, the changes in the port interface cost indices should be interpreted with caution given the provisional nature of the reported stevedoring charges. Even if stevedoring charges did not change during the January–June 1998 period, care should also be taken in making inter-port comparisons of port interface costs. The use of a single stevedoring charge for all ports reflects the scope of the available information which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

National index

Figure 7 provides the national Port Interface Cost Index since it was first produced for the July–December 1992 period. The figure also shows the Port Interface Cost Index in real terms. Again the reader is reminded that care should be taken in interpreting the data for the more recent periods.

In overall terms, the index increased by less than half a per cent for both imports ($665 per teu) and exports ($611 per teu) in the January–June 1998 period. In real terms, this represents a decrease of just under 1 per cent. Since the initial development of the Port Interface Cost Index, national port interface costs have fallen, in real terms, by approximately 13 per cent for imports and 10 per cent for exports.

FIGURE 7 THE NATIONAL PORT INTERFACE COST INDEX



Sources *BTE 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 gross non-farm product deflator data (cat. no. 5206.0).*

PORT PERFORMANCE — NON-FINANCIAL

Non-financial indicators for the five mainland capital city ports in 1997/98 are presented in table 8. The January–June 1998 indicators include the period of the major industrial dispute between Patrick and the MUA and therefore do not necessarily represent a typical comparison with previously published indicators for the individual ports.

Cargo throughput

Total cargo throughput at the five ports increased to 45.2 million tonnes in the January–June 1998 period, compared with 43.6 million tonnes in the July–December 1997 period. There were increases in throughput at Brisbane (9.9 per cent), Adelaide (28.8 per cent), and Fremantle (5.0 per cent), and decreases at Sydney (3.7 per cent) and Melbourne (1.1 per cent).

Overall this was a rise of 3.8 per cent in total throughput for the five ports compared with the previous half year, but a fall of 0.3 per cent when compared with the January-June 1997 period.

The tonnage of *non-containerised general cargo* handled at the five ports fell by 6 per cent to 2.4 million tonnes in the January–June 1998 period (2.5 million tonnes in the July–December 1997 period). All five ports contributed to this fall, with Adelaide recording the largest decrease (21.5 per cent) and Fremantle the smallest (3.0 per cent). However, the non-containerised general cargo throughput for the five ports in the January–June 1998 period represents a 5.8 per cent increase compared with the same period in 1997.

TABLE 8 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1997/98

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five ports[d]	
Indicator	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1997	Jan–Jun 1998
Total cargo throughput ('000 tonnes)	9733	10700	11390	10969	9434	9334	2387	3075	10612	11142	43557	45220
Non-containerised general cargo ('000 tonnes)[a]	540	517	404	385	1057	991	150	118	377	366	2527	2376
Containerised cargo (teus exchanged)												
Full import	55283	57082	214301	189423	243319	217602	16261	19454	54848[r]	53984	584012	537545
Empty import	26982	22450	8165	7504	39124	30878	8461	7855	10474	11134	93206	79821
Full export	67356	66838	133463	116244	213186	197025	24630	24730	46483[r]	48819	485118	453656
Empty export	10165	11412	62252	66857	49080	50596	2939	3582	10962[r]	14098	135398	146545
Total teus	159786	157782	418181	380028	544709	496101	52291	55621	122767[r]	128035	1297734	1217567
Average total employment[b]	180	152	292	269	70	70	170	167	189	184	811	773
Turnaround time (hrs)[c]												
Median result	32	36	38	36	41	44	18	20	24	24	-	-
95th percentile	54	97	67	73	73	132	37	57	61	58	-	-

- not applicable
a Excludes bulk cargoes.
b Comparisons between ports are not appropriate since each port authority/corporation has a different structure.
c Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.
d Components may not sum to totals due to rounding.

Source AAPMA.

Measured in teus, *container traffic* for the five ports fell by 6.2 per cent to 1.2 million teus in the January–June 1998 period (1.3 million teus in July–December 1997). Throughput of loaded teus decreased by 7.3 per cent, with loaded imports decreasing by 8.0 per cent and loaded exports decreasing by 6.5 per cent.

During the January–June 1998 period throughput of loaded containers increased at Brisbane (1.0 percent), Adelaide (8.1 per cent) and Fremantle (1.5 per cent), and decreased at Sydney (12.1 per cent) and Melbourne (9.2 per cent) in comparison with the previous half-year.

The five-port total container traffic increased by 10.1 per cent in the July 1997 to July 1998 year compared with the previous 12 month period, with full container throughput increasing by 8.7 per cent over the same period.

Employment

Table 8 indicates that *average total employment* at the five mainland capital city port authorities/corporations fell by 4.7 per cent in the January–June 1998 period. This follows a 10.6 per cent fall between January–June 1997 and July–December 1997 and represents a 19.2 per cent fall in average total employment since mid-year 1996.

CREW TO BERTH RATIOS

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 8 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the BTE is still auditing the data, the June quarter 1998 merchant shipping data in this issue of *Waterline* are classified as preliminary. The crew to berth ratio for merchant shipping totalled 2.102 in the June quarter, compared with 2.104 in the March quarter, and below the initial level of 2.133 in the September quarter 1993.

Table 9 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the June quarter. Ship time is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio fell to 1.020 in the March quarter, compared with 1.032 in the previous quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35 hour week. The accrued leave ratio was 0.951 in the June quarter, compared with 0.958 in the March quarter.

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

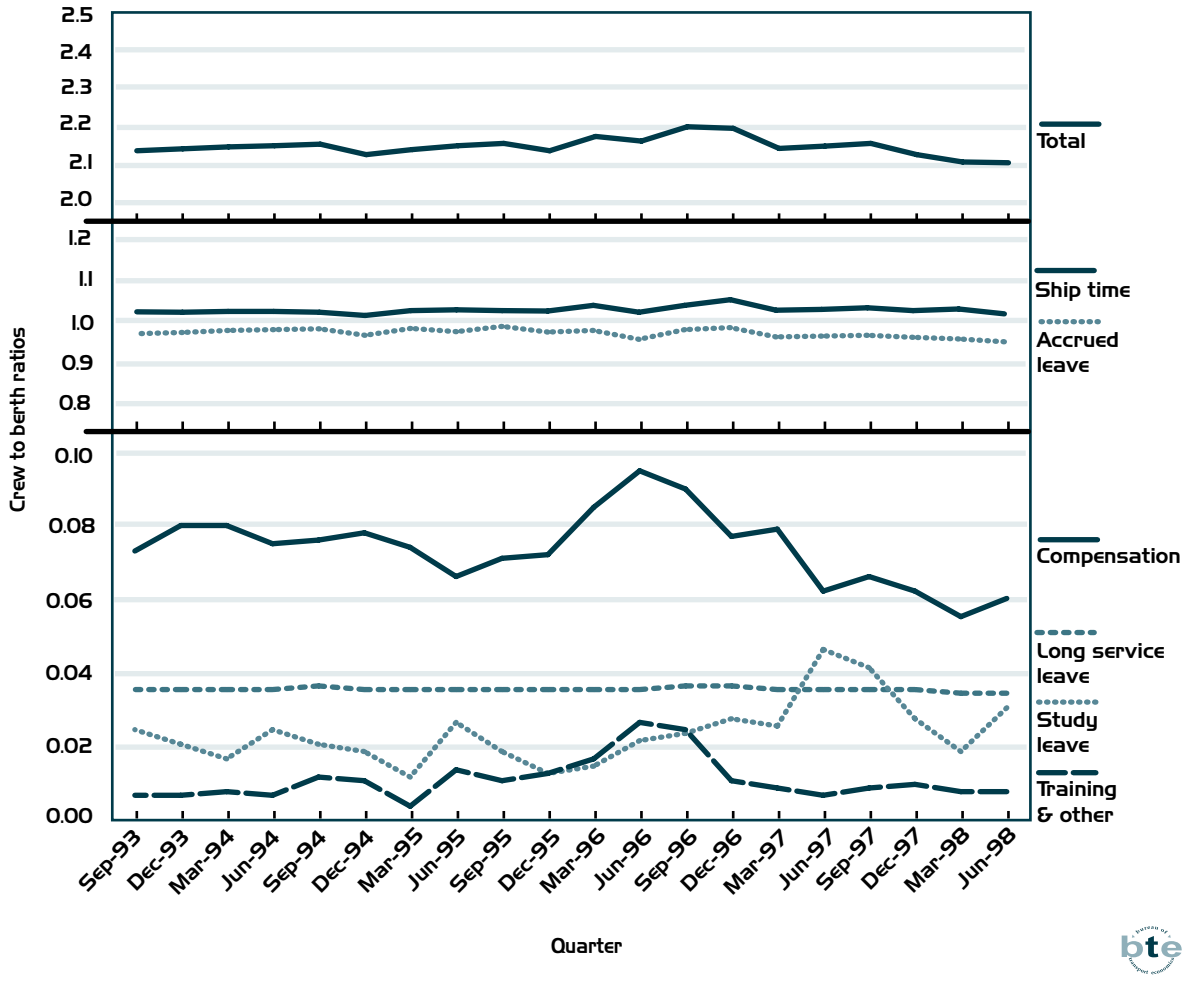


TABLE 9 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, JUNE QUARTER 1998[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.043	0.974	0.019	0.035	0.037	0.019	2.127
Engineers	1.025	0.957	0.048	0.035	0.094	0.008	2.167
All officers	1.033	0.965	0.034	0.035	0.066	0.013	2.148
Integrated ratings	1.007	0.937	0.085	0.034	0.001	0.001	2.064
Catering crew	1.012	0.942	0.073	0.034	0.000	0.001	2.061
All ratings	1.008	0.939	0.081	0.034	0.000	0.001	2.063
All crew	1.020	0.951	0.060	0.034	0.031	0.007	2.102
Previous quarter	1.032	0.958	0.055	0.034	0.018	0.007	2.104
Initial level[b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a Components may not sum to totals due to rounding.
b Initial level for September quarter 1998.

Source Data provided by ship operators.

Other components of the merchant shipping crew to berth ratio were:

- Compensation leave rose to 0.060 compared with 0.055 in the March quarter;
- Long service leave remained constant at 0.034;
- Study leave rose to 0.031 compared with 0.018 in the March quarter; and
- Training and other paid leave remained constant at 0.007

Offshore shipping

Figure 9 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. As the BTE is still auditing the data, the June quarter 1998 offshore shipping data in this issue of *Waterline* are classified as preliminary.

The crew to berth ratio for offshore shipping was 2.322 in the June quarter, compared with 2.337 in the March quarter 1998, and the initial March quarter 1995 level of 2.327.

Table 10 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the June quarter. Accrued leave is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two crew duty system, annual leave and time spent travelling in off duty time. The accrued leave ratio for the June quarter remained unchanged at 1.153.

Ship time also represents a significant part of the offshore crew to berth ratio and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio for the June quarter was 1.017, compared with 1.022 in the previous quarter.

Other components of the offshore crew to berth ratio were:

- Compensation leave fell to 0.092 compared with 0.109 in the March quarter;
- Long service leave remained constant at 0.038;
- Study leave rose to 0.022 compared with 0.011 in the previous quarter; and
- Training and other paid leave fell to 0.000 from the previous quarter's 0.004.

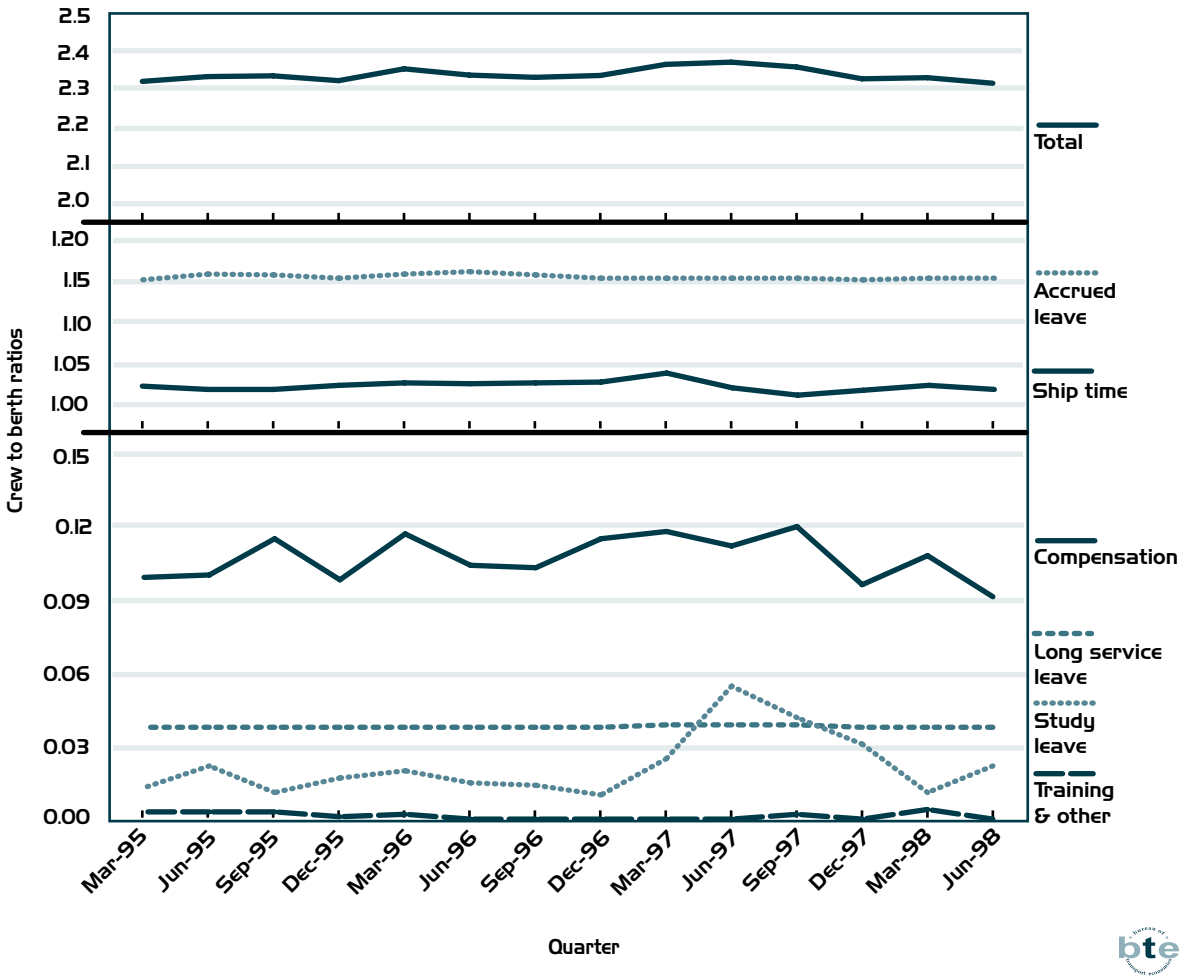
TABLE 10 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, JUNE QUARTER 1998[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.016	1.153	0.092	0.037	0.045	0.000	2.283
Engineers	1.018	1.153	0.018	0.037	0.048	0.000	2.274
All officers	1.017	1.153	0.025	0.037	0.047	0.000	2.279
Integrated ratings	1.015	1.153	0.137	0.038	0.000	0.000	2.344
Catering crew	1.027	1.153	0.236	0.040	0.000	0.000	2.456
All ratings	1.017	1.153	0.153	0.039	0.000	0.000	2.362
All crew	1.017	1.153	0.092	0.038	0.022	0.000	2.322
Previous quarter	1.022[r]	1.153[r]	0.109[r]	0.038	0.011	0.004	2.337
Initial level[b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p preliminary
r revised
a Components may not sum to totals due to rounding.
b Initial level for March quarter 1995.

Source Data provided by ship operators.

FIGURE 9 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING



ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BTE	Bureau of Transport Economics
GRT	Gross Registered Tonnage
MUA	Maritime Union of Australia
NRT	Net Registered Tonnage
teu	Twenty-foot equivalent unit
WIRA	Waterfront Industry Reform Authority

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

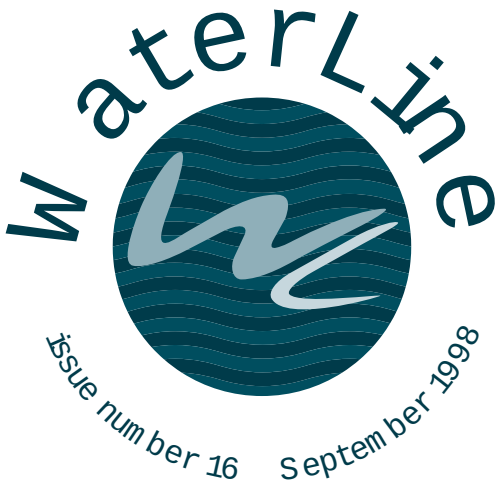
TABLE II CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS–PRODUCTIVITY IN TEUS PER HOUR

	Sep–95	Dec–95	Mar–96	Jun–96	Sep–96	Dec–96	Mar–97	Jun–97	Sep–97	Dec–97	Mar–98	Jun–98
Five ports												
Ships handled	721	728	748	827	871	907	865	891	907	963	969	845
Total teus	433594	425731	411538	440098	497140	519206	441697	483372	549247	585474	527881	514409
Crane rate	19.5	19.2	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6
Elapsed rate	22.5	21.7	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na
Net rate	26.5	25.3	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6 r	31.3
Brisbane												
Ships handled	135	132	124	133	140	141	156	164	162	177	170	168
Total teus	58851	46439	39037	51008	66115	62904	47471	65572	73184	71043	58857	74023
Crane rate	18.6	18.9	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6
Elapsed rate	19.5	21.0	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5
Net rate	22.5	24.6	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0 r	25.4
Sydney												
Ships handled	192	203	206	216	228	249	251	249	243	266	238	219
Total teus	148431	143746	146038	148290	156344	174982	158323	167705	183978	201535	176496	168234
Crane rate	19.3	18.5	19.5	19.9	20.3	19.6	22.3	22.6	23.5	23.5	22.5	21.8
Elapsed rate	23.4	21.8	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1
Net rate	29.9	25.7	28.0	27.9	29.5	28.9	32.2	32.7	36.1	35.5	33.1 r	33.9
Melbourne												
Ships handled	221	227	228	262	274	282	230	249	268	281	276	234
Total teus	161943	173566	162911	170884	203371	202376	162156	177070	208200	223465	207346	185803
Crane rate	19.8	19.6	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3
Elapsed rate	24.1	22.8	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8
Net rate	26.6	26.4	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6 r	39.7
Adelaide												
Ships handled	34	42	47	63	70	74	69	65	68	66	69	66
Total teus	14319	17318	15955	18803	20519	23351	21963	20933	25982	25188	22260	27975
Crane rate	20.9	21.4	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7
Elapsed rate	24.9	26.1	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5
Net rate	26.5	26.7	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8
Fremantle												
Ships handled	139	124	143	153	159	161	159	164	166	173	165	158
Total teus	50050	44662	47597	51113	50791	55593	51784	52092	57903	64243	62922	58374
Crane rate	19.5	19.2	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7
Elapsed rate	17.7	15.8	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na
Net rate	21.1	19.8	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4 r	29.8

na not available
r revised

Notes 1 The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period, during which time the company was involved in a major industrial dispute with the MUA.
2 Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator s information systems.
3 For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.



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Investing in Australian container stevedoring capacity

In *Waterline 16*, the BTE commented on the Australian container transport system's ability to adapt to a significant reduction in capacity caused by the industrial dispute between Patrick and the Maritime Union of Australia (MUA). The BTE questioned the strength of the argument for further container terminal investment in Australia based on the grounds of capacity shortages.

The article was based on a simple analysis and was offered as an observation on what is a very complex issue. Building a new container terminal is not cheap, particularly compared with the alternative of improving the utilisation of existing capacity. On the other hand, new container terminals are not built overnight, and therefore some consideration needs to be made regarding future demand on the Australian container transport system. On this note, it is interesting that over the past 5 years Australian container throughput, *measured in teus*, has increased by approximately 80 per cent (see page 7 of this issue).

Equating demand with capacity is relatively straight forward. However, assessing the many other issues involved in expanding Australian container terminal capacity is far more complex. Some of the major issues include:

- the commercial viability of the investment;
- the stevedoring industry competition implications;
- the effect on supporting infrastructure such as land transport services; and
- the balance between port, state and national interests.

Determining the commercial viability of investing in the Australian container stevedoring industry is arguably best left to the investor. However, should such an investment fail, the implications for stakeholders in the industry may be significant and difficult to predict.

Within a port, increasing the competitiveness of container stevedores may be achieved by increasing the number of stevedores. However, the incumbent major Australian container stevedores provide a *network* of services. Consequently, the introduction of a new terminal operator in one port may not be sufficient to reduce to any great extent the competitive advantage the incumbent stevedores derive from their networks. An alternative strategy may be to allow incumbent stevedores to expand their terminals in such a way that maintains a competitive incentive to 'poach' customers from each other. But this 'economies of scale' argument cannot be pursued indefinitely as there are physical constraints on continued terminal expansion.

Increasing the performance of a port's container stevedoring services may be achieved without expansion of that port's terminal capacity. Instead, performance improvements could be achieved by introducing new terminal capacity in a competing port. However, there is little incentive for a port to encourage investments in competing ports, even though the net national benefits may be significant.

Finally, any investment to increase container stevedoring capacity within a port must be matched by appropriate land transport infrastructure responses. The benefits of increased terminal capacity to the port may be less than the social cost to the city the port serves. Possibly the largest of these costs would be increased traffic congestion around the port and adjacent suburbs.

These are just brief comments on some of the issues involved in expanding Australian container stevedoring capacity. However, one factor encompasses all these issues and that is the balance between the competing interests of all the stakeholders in the Australian container stevedoring industry. Consequently, when reading about the arguments for and against container terminal investment strategies in this country, the reader should always be conscious of whose interests are served by the different arguments and strategies.

UNDERSTANDING CONTAINER HANDLING STATISTICS

This article is an edited version of a research note produced by Greg Baker of the Information and Research Services (IRS) team of the Department of the Parliamentary Library. The research note was produced by IRS during the Patrick and MUA dispute earlier this year. The BTE is very grateful to the Department of the Parliamentary Library for permission to reproduce its work as the basis of this article.

A wide variety of indicators can be used to assess Australia's waterfront performance. Important among these are what the Bureau of Transport Economics (BTE) calls *stevedoring performance indicators* and the Productivity Commission calls *capital productivity measures*. How are these indicators defined? And are these indicators internationally comparable? To understand the statistics it is necessary to be aware of some of the factors used in the measurement of productivity.

Container sizes

Standard shipping containers are specified by the International Standards Organisation as 20 feet long by 8.5 feet square. This is the standard unit for measuring container throughput; that is, one such standard container is 1 *twenty-foot equivalent unit* or 1 teu.

Other containers can be counted as equivalent to a number of teus. For example, a 40-foot container, which is 40 feet long by 8.5 feet square, is equivalent to 2 teus. Non-standard container sizes can also be measured to give a teu value for use in calculating statistics.

Ports

The physical features and the trade characteristics of a port can influence productivity measurement. For example, a port with a low volume of throughput, compared with the capacity of the infrastructure of the port, tends to facilitate higher productivity levels, although possibly at a higher cost.

Time

Most stevedoring performance measures are based on time. However, the way time is measured can vary from one indicator to the next.

Elapsed time is the total time over which a ship is worked, measured from first labour aboard to last labour ashore.

Net time is the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, inclement weather, awaiting cargo, industrial disputes, closed port holidays, or shifts not worked at the ship operator's request.

Consequently:

- The *elapsed rate* is measured by dividing throughput by elapsed time;
- The *net rate* is measured by dividing throughput by net time; and
- The *crane rate* is measured as the average net rate per crane.

That is, the crane rate is a measure of productivity per crane whilst the elapsed and net rates are measures of productivity per ship handled.

Container movements teus

There are two measuring units in general use that indicate waterfront productivity in terms of the throughput of containers. The first, and one which has been measured in Australia since 1989, is to form the measure in terms of the number of teus handled.

A disadvantage of using measures based on teus, whether for national or international comparisons, is that the productivity statistics may be affected by differences in the mix of 20-foot and 40-foot containers. Many large overseas ports have a high proportion of 40-foot containers and thus, all other things being equal, will show higher crane rates, measured in teus, than Australian ports which have a lower proportion of 40-foot containers. Furthermore, any changes in the mix of 20-foot and 40-foot containers since 1989 mean that even Australian statistics are not strictly comparable over this period.

Container movements lifts

The second unit of measure of container movements simply counts the number of container movements regardless of the size of the containers. This method, to some extent, overcomes problems associated with the mix of 20-foot and 40-foot containers.

International comparisons

While the above indicators are useful to show changes in waterfront productivity over time, they need to be treated with caution if used to make comparisons with waterfront productivity in overseas ports.

The Productivity Commission's 1998 study *International Benchmarking of the Australian Waterfront*[1] shows a number of overseas ports exceeding Australia's crane rate measured in lifts per hour. However, this may in part be a function of the trade carried out. For instance, in the South-East Asian trade, Fremantle crane rates exceed those of high-ranking Singapore. It is therefore not entirely valid to use these stevedoring productivity indicators for comparisons with overseas ports.

Moreover, factors such as stowage, the proportion of a ship's total containers handled at any particular port, the characteristics of the ships exchanging containers, and the terminal equipment available all contribute significantly towards the productivity rate at overseas ports as well as at Australian ports. It has often been said that stevedoring productivity should not be compared, even between Australian ports, because of the underlying differences pertaining at each of the ports.

STEVEDORING PRODUCTIVITY

Table 1 presents the September quarter 1996 to September quarter 1998 indicators of stevedoring productivity for the five major Australian container terminals, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to September quarter 1998 period. The data for Brisbane, Sydney, Melbourne and Fremantle are weighted averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal.

Fremantle elapsed rate data from one operator are not available and therefore only a four-port average indicator could be calculated. However, given that the five-port average is dominated by Melbourne and Sydney, the four-port figure calculated is a reasonable approximation of the five-port average.

Overall, national stevedoring productivity, as measured by the five-port average, changed little in the September quarter compared with the June quarter:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 19.1 containers per hour for the September quarter compared with 18.7 in the June quarter;
- the four-port (Fremantle data not available) average *elapsed rate* (productivity *per ship* based on the time labour is aboard the ship) remained unchanged at 20.7 containers per hour in the September quarter; and
- the five-port average net rate (productivity *per ship* while the ship is worked) was 24.2 containers per hour compared with 24.7 containers in the June quarter.

The *Brisbane* average crane rate was 18.2 containers per hour in the September quarter, up from 17.3 in the June quarter. The Brisbane elapsed rate of 18.7 containers per hour and the net rate of 21.9 containers per hour were both up on the June quarter figure. These September quarter crane, elapsed and net rates are the highest container productivity rates to date for Brisbane. The average proportion of elapsed time not worked decreased a little to 14.6 per cent.

The *Sydney* average crane rate was 16.5 containers per hour in the September quarter, down from 16.9 in the June quarter. The Sydney elapsed rate of 19.2 containers per hour and the net rate of 24.2 containers per hour were both down on the June quarter figure. This decline in productivity, coincides with media reports of ongoing unrest at both

1. Productivity Commission, *International Benchmarking of the Australian Waterfront*, Research Report, AusInfo, Canberra, April 1998.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS—PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98
Five ports									
Ships handled	871	907	865	891	907	963	909	845	1020
Total containers	400201	416977	357848	387277	431853	467122	421769	406938	493502
Crane rate	18.0	17.1	18.4	18.3	18.3	18.5	18.8	18.7	19.1
Elapsed rate	19.0	na	18.6	19.0	20.4	20.5	20.0[a]	20.7[a]	20.7[a]
Net rate	23.5	21.8	23.4	23.6	24.3	24.3	23.4	24.7	24.2
Elapsed time not worked (per cent)	19.1	na	20.3	19.2	16.2	15.7	14.6[a]	16.2[a]	14.5[a]
Brisbane									
Ships handled	140	141	156	164	162	177	170	168	192
Total containers	53690	51815	40696	52610	58424	58014	49197	58939	70200
Crane rate	16.5	16.9	17.3	16.4	16.1	16.8	18.0	17.3	18.2
Elapsed rate	17.2	17.4	17.3	16.6	16.8	16.8	16.4	17.1	18.7
Net rate	20.4	20.4	19.4	18.7	19.1	19.6	19.1	20.2	21.9
Elapsed time not worked (per cent)	15.7	15.0	10.8	11.5	11.7	14.6	13.9	15.4	14.6
Sydney									
Ships handled	228	249	251	249	243	266	238	219	267
Total containers	123390	137542	126265	131004	142659	157430	137600	130513	160007
Crane rate	16.1	15.4	17.7	17.7	18.2	18.4	17.5	16.9	16.5
Elapsed rate	18.2	na	18.2	18.5	21.7	21.9	19.9	20.2	19.2
Net rate	23.3	22.7	25.7	25.5	27.9	27.7	25.7	26.2	24.2
Elapsed time not worked (per cent)	21.9	na	29.4	27.6	22.4	20.7	22.5	22.9	20.7
Melbourne									
Ships handled	274	282	230	249	268	281	276	234	309
Total containers	163297	161865	130459	143708	162591	178302	166284	147122	187696
Crane rate	19.6	17.8	19.0	19.0	18.6	18.8	19.5	19.2	20.2
Elapsed rate	21.1	17.9	19.5	20.3	20.5	19.9	20.1	21.0	21.8
Net rate	25.6	21.7	23.0	24.0	23.5	22.6	22.7	24.2	24.5
Elapsed time not worked (per cent)	17.6	17.8	15.3	15.4	13.0	11.9	11.6	13.3	11.1
Adelaide									
Ships handled	70	74	69	65	68	66	60	66	63
Total containers	17415	19047	17486	16874	20974	20773	18163	23293	21444
Crane rate	19.3	19.6	19.6	21.0	21.1	21.4	22.5	23.1	23.2
Elapsed rate	22.2	22.6	24.0	28.3	28.4	29.2	29.6	30.4	29.0
Net rate	22.8	23.1	24.6	29.1	29.2	30.1	30.7	31.5	30.3
Elapsed time not worked (per cent)	2.6	2.2	2.4	2.7	2.7	3.0	3.6	3.5	4.3
Fremantle									
Ships handled	159	161	159	164	166	173	165	158	189
Total containers	42409	46707	42942	43081	47205	52603	50525	47071	54155
Crane rate	17.8	18.2	19.4	19.0	18.8	18.9	19.6	21.5	22.2
Elapsed rate	13.4	15.6	16.2	15.9	17.0	18.9	na	na	na
Net rate	19.4	20.5	20.6	19.8	20.6	23.2	21.1	23.9	23.8
Elapsed time not worked (per cent)	30.9	23.9	21.5	19.5	17.6	18.4	na	na	na

na not available

a Four port average only as Fremantle elapsed rate data are not available .

Notes
1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.
2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator s information systems.
3. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 9.
4. Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.

Sources Patrick, P&O Ports and Sea-Land.

Botany Bay terminals during the September quarter. The average proportion of elapsed time not worked decreased to 20.7 per cent.

The *Melbourne* average crane rate was 20.2 containers per hour in the September quarter, up from 19.2 in the June quarter. The Melbourne elapsed rate of 21.8 containers per hour and the net rate of 24.5 containers per hour were both up on the June quarter figures. Melbourne's crane and elapsed rates are the highest so far recorded for Melbourne in *Waterline* while the net rate is the second highest recorded for Melbourne. Elapsed time not worked decreased to 11.1 per cent, which is the lowest recorded for Melbourne to date.

The *Adelaide* average crane rate was 23.2 containers per hour in the September quarter, compared with 23.1 containers per hour in the June quarter. Of Australia's five major container ports, Adelaide remains the port with the highest crane rate. The Adelaide elapsed rate of 29.0 containers per hour and the net rate of 30.3 containers per hour were both down on the June quarter figures. The average proportion of elapsed time not worked increased to an all-time Adelaide high of 4.3 per cent; nevertheless, this figure is still considerably lower than those attained at the other four ports, and reflects the nature of the stevedoring task at Adelaide.

The *Fremantle* average crane rate was 22.2 containers per hour in the September quarter, up from 21.5 containers per hour in the June quarter. The elapsed data from one operator, for the period March to September 1998, are not available and therefore the elapsed data for Fremantle have not been produced for these quarters. The net rate of 23.8 containers per hour was slightly down on the June quarter figure. The September quarter crane rate is Fremantle's highest quarterly rate to date while the net rate is its second highest.

Teus per hour

Table 9 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purposes of recording long-term historical trends; the trends are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20 foot and 40 foot containers from one period to the next.

Nevertheless, over the period since monitoring first began in the December quarter 1989, the five-port average crane and net rates for the September quarter 1998 are the highest achieved to date. Over the same period, Brisbane (crane rate), Melbourne (crane, elapsed and net rates), and Fremantle (crane and net rates) have achieved record levels. Adelaide's crane rate has dropped very marginally from its record level achieved in the June quarter 1998.

Container Port Activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The September quarter 1998 five-port figure showed a 20.7 per cent increase in ship visits and a 21.3 per cent increase in container throughput when compared with the June quarter. Compared with the September quarter of the previous year the five-port figure for container ship visits rose by 12.5 per cent while the five-port average for container throughput rose by 14.3 per cent.

In light of the Patrick and MUA industrial dispute during the June quarter 1998, a port by port container exchange comparison with the June quarter may require careful interpretation. Nevertheless, the September quarter 1998 container exchange at:

- Brisbane was up 19.1 per cent on the June quarter figure, and up 20.2 cent when compared with the September quarter 1997;
- Sydney was up 22.6 per cent on the June quarter figure, and up 12.2 per cent when compared with the September quarter 1997;
- Melbourne was up 27.6 per cent on the June quarter figure, and up 15.4 per cent when compared with the September quarter 1997.

FIGURE 1 FIVE MAJOR PORTS

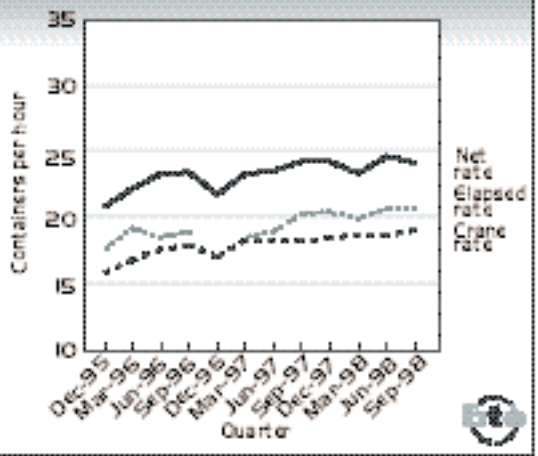


FIGURE 2 BRISBANE

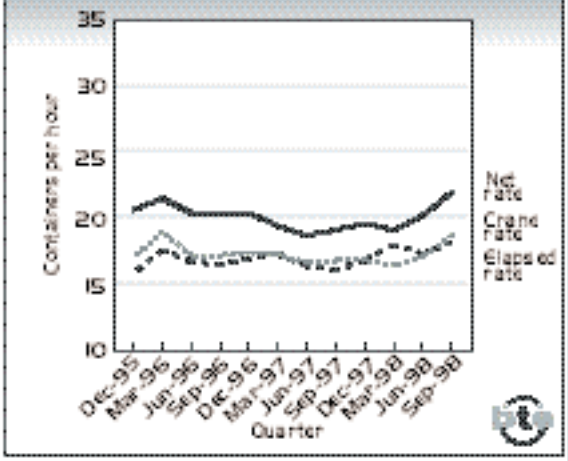


FIGURE 3 SYDNEY

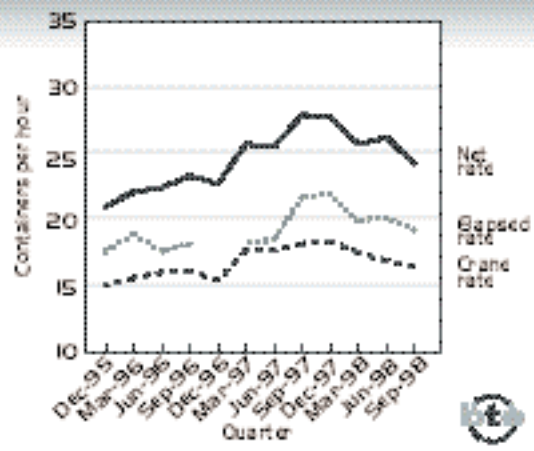


FIGURE 4 MELBOURNE

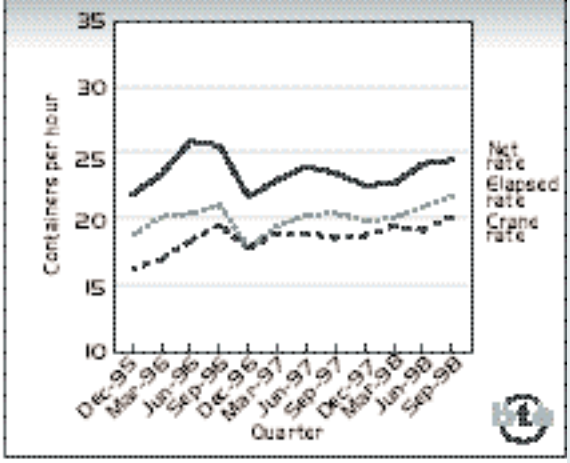


FIGURE 5 ADELAIDE

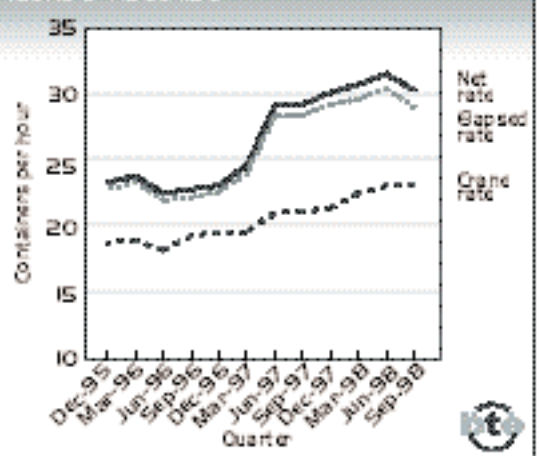
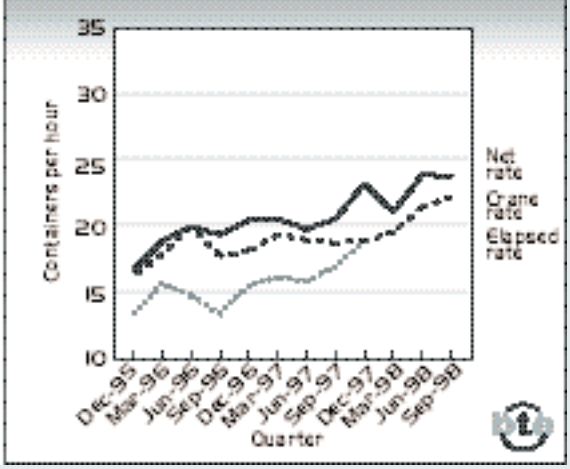


FIGURE 6 FREMANTLE



Note *These figures are based on the data contained in table 1. Readers should refer to the notes in that table.*

Sources *Patrick, P&O Ports and Sea-Land.*

- Adelaide was down 7.9 per cent on the June quarter figure, and up 2.2 per cent when compared with the September quarter 1997.
- Fremantle was up 15.0 per cent on the June quarter figure, and up 14.7 per cent when compared with the September quarter 1997.

Compared with the September quarter 1993, the five-port figure for container ship visits has increased by about 50 per cent while the five-port figure for container throughput, *measured in teus*, increased by about 80 per cent.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the September quarter 1998. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

The sample for the September quarter covers 278 ship calls, equivalent to 27 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 20 per cent at Brisbane to 37 per cent at Adelaide. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 91 per cent in the September quarter 1998, up from 68 per cent in the June quarter 1998. Figure 7 provides information on berth availability over the period since this indicator was first published by the BTE.

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 15 hours in the September quarter. This was down from the figure of 34 hours recorded during the previous quarter when there was a major dispute involving Patrick and the MUA.

The data for the June and September quarters indicate that berth availability rose significantly at most ports. Caution should be used in undertaking inter-port comparisons of berth availability as there is significant variation between ports in sample sizes and ship call patterns.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, SEPTEMBER QUARTER 1998

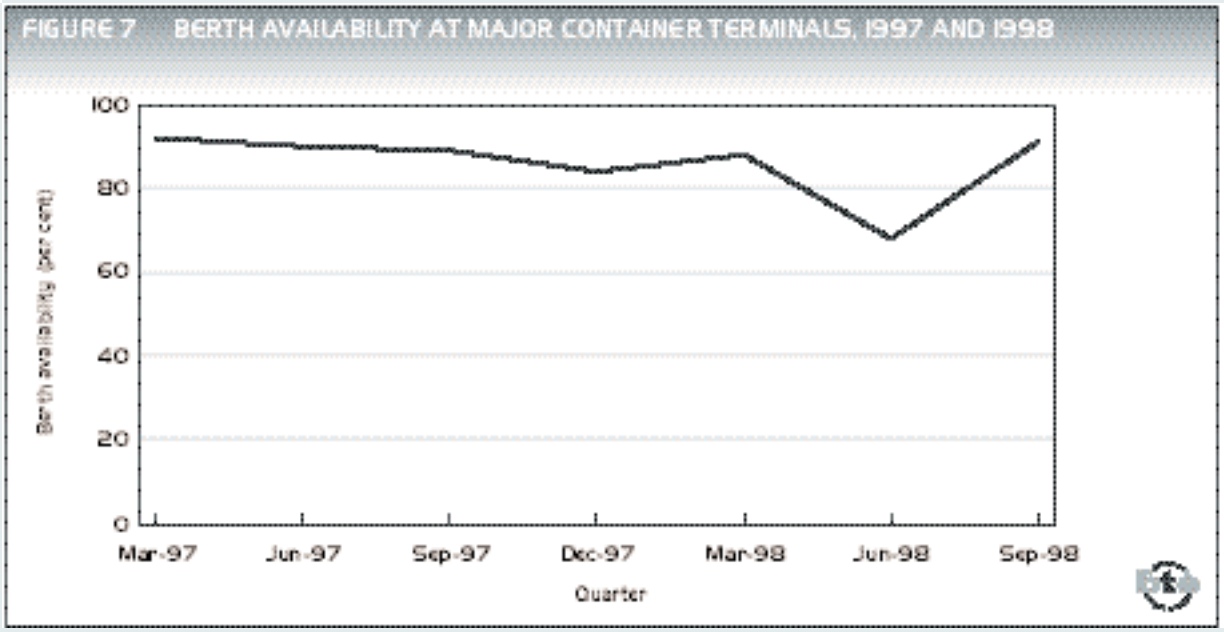
(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5-10	11-20	>20	Total no. of ship calls
Brisbane									
Berth availability	36	0	0	1	1	0	1	0	39
Pilotage	39	0	0	0	0	0	0	0	39
Towage	39	0	0	0	0	0	0	0	39
Sydney									
Berth availability	60	2	0	1	1	4	5	4	77
Pilotage	77	0	0	0	0	0	0	0	77
Towage	77	0	0	0	0	0	0	0	77
Melbourne									
Berth availability	75	0	0	0	0	3	4	2	84
Pilotage	84	0	0	0	0	0	0	0	84
Towage	83	0	0	0	1	0	0	0	84
Adelaide									
Berth availability	22	0	0	1	0	0	0	0	23
Pilotage	23	0	0	0	0	0	0	0	23
Towage	23	0	0	0	0	0	0	0	23
Fremantle									
Berth availability	52	0	1	0	0	1	1	0	55
Pilotage	55	0	0	0	0	0	0	0	55
Towage	55	0	0	0	0	0	0	0	55
Five ports									
Berth availability	245	2	1	3	2	8	11	6	278
Pilotage	278	0	0	0	0	0	0	0	278
Towage	277	0	0	0	1	0	0	0	278

Note Inter-port comparisons should be interpreted with caution as there is significant inter-port variation in factors such as sample sizes and ship call patterns.

Sources Data for a sample of ship calls provided by shipping lines.

FIGURE 7 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997 AND 1998



Sources *Data for a sample of ship calls provided by shipping lines.*

ship within one hour of the confirmed ship arrival/departure time. The proportions were effectively unchanged at around 100 per cent in the September quarter 1998.

Other waiting time

The eight shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments (for example, instances where the shipping line holds the ship off the port or at the berth in order to maintain the fixed-day schedule).

In the September quarter 1998, 57 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. This was above the proportions of 51 and 53 per cent that were recorded in the March and June quarters.

Table 3 summarises the data on other waiting time incidents in the September quarter 1998. The shipping lines identified a total of 212 incidents (affecting 159 ship calls) for the sample of ship calls over this period. Around one-quarter of the ship calls that incurred other waiting time were affected by two or more incidents.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. In the September quarter 1998, four incident types accounted for around three-quarters of the total hours attributable to other ship waiting time:

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, SEPTEMBER QUARTER 1998

(Number of incidents)

Incident type	Ship waiting time (hrs)							Total no. of incidents
	1	2	3	4	5-10	11-20	>20	
Awaiting labour	2	10	8	4	17	9	6	56
Stevedoring finished late	1	2	0	0	14	10	6	33
Stevedoring finished early	4	7	5	4	3	0	0	23
Early ship arrival	1	1	0	2	7	4	4	19
Weather or tides	3	3	0	1	6	2	1	16
Crane breakdown	5	6	3	0	1	0	0	15
Industrial action	1	0	2	1	4	3	1	12
Pilot/tug booking not at preferred time	2	4	0	3	1	0	0	10
Ship repairs or maintenance	1	1	0	0	2	1	5	10
Late ship arrival	0	0	0	0	1	0	0	1
Other	3	5	3	2	3	0	1	17
Total incidents	23	39	21	17	59	29	24	212[a]

a These incidents affected 159 of the 278 ship calls covered in table 2.
Sources Data for a sample of ship calls provided by shipping lines.

- Stevedoring finished late (24 per cent);
- Awaiting labour (24 per cent);
- Ship repairs or maintenance (15 per cent);
- Early ship arrival (14 per cent).

The proportion for ship repairs or maintenance was higher than usual as several ships had major mechanical breakdowns during the quarter.

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at the major container terminals–stevedoring rate and cargo receival. Data are not available for Adelaide or Fremantle.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The stevedoring rate indicator was 56 and 65 per cent at the two ports for which data are available in the September quarter 1998.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container terminal performance. In the September quarter 1998, cargo receival ranged between 82 per cent and 97 per cent at the three ports for which data are available.

Information on a third indicator, *stevedoring completion*, has been included in past issues of *Waterline*. This indicator provides a partial measure of the accuracy with which stevedoring time is predicted. One of the major terminal operators has advised the BTE that data for the stevedoring completion indicator are no longer available from its data collection system due to major changes in work practices and recording activities. Data for three ports are available from the other major operator but cannot be published due to commercial confidentiality issues.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice. The overall accuracy of this advice was unchanged in the September quarter 1998.

The first indicator of ship arrival advice is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation *at 24 hours prior to actual arrival*. The proportion at the four ports for which data are available ranged between 49 per cent and 79 per cent in the September quarter 1998.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. The proportion ranged between 88 per cent and 96 per cent in the September quarter 1998.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, JUNE AND SEPTEMBER QUARTERS 1998

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Apr-Jun	Jul-Sep	Apr-Jun	Jul-Sep	Apr-Jun	Jul-Sep	Apr-Jun	Jul-Sep	Apr-Jun	Jul-Sep
Stevedoring										
Stevedoring completion	na	na	na	na	na	na	na	na	na	na
Stevedoring rate	60	56	58	65	57	na	na	na	na	na
Cargo receival	97	97	93	82	94	97	na	na	na	na
Ship arrival										
Advice at 24 hrs	70	79	46	49	na	na	57	66	57	55
Advice inside 24 hrs	100	96	92	88	na	na	95	94	99	91

na not available

Sources AAPMA, Patrick and P&O Ports

TABLE 5 SINGLE VOYAGE PERMITS ISSUED[a] AND CARGO CARRIED, 1990/91–1997/98

Year	July to Sept		Oct to Dec		Jan to March		April to June		Total	
	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes
1990/91	32	195711	38	450622	44	262431	26	189565	140	1098329
1991/92	34	422161	61	414191	49	243049	59	241373	203	1320774
1992/93	62	238017	69	147514	83	211430	93	298769	307	895730
1993/94	108	202252	125	292664	119	412029	118	498571	470	1405516
1994/95	110	899222	112	970068	116	832308	90	665499	428	3367097
1995/96	91	1077022	109	653940	107	575662	123	930077	421	3236701
1996/97	142	1026438	146	1110332	135	661784	149	1056709	572	3855263
1997/98	197	1307369	214	1009151	184	1266030	184	1301204	779	4883754

a As from January 1998 the data are collected as permits issued; prior to 1998 the data were collected as permits used. Most SVPs issued are used and therefore the differences in the data are not likely to be significant.

Source Maritime Transport Division of the Department of Transport and Regional Services.

SINGLE VOYAGE PERMITS

The *Navigation Act 1912* provides for licensed vessels to carry passengers and cargo in the coasting trade. The Act does not restrict the class of vessels which may obtain a Coasting Trade Licence. Any ship, regardless of registry, can obtain a licence provided:

- the crew are paid Australian wages whilst actually engaged in the Australian coasting trade, and
- the ship is not in receipt of a foreign Government subsidy, and did not receive such a subsidy in the previous twelve months.

Ships which obtain a licence must also conform to the requirements of the *Navigation Act* including specified safety, manning, crew qualifications and rehabilitation and compensation provisions. Where suitable licensed vessels are not available, the Act provides for the issue of single voyage permits (SVP) or continuing voyage permits (CVP) to unlicensed vessels, where this is considered to be in the public interest.

The application fee for a passenger SVP is $22, and $200 for a cargo SVP. The application fee for a CVP is $400.

Table 5 updates the SVP information published in *Waterline 14*. It provides information on the number of SVPs issued and the cargo carried from 1990/91 to 1997/98. The number of these permits issued has increased over time, by approximately:

- 450 per cent over the past 7 years;
- 150 per cent over the past 5 years;
- 80 per cent over the past 3 years.

This increasing number of permits for the coastal trade reflects an increase in shippers' requirements that cannot be met by local ship operators.

Table 6 shows a breakdown of SVPs by cargo types for the September quarter 1998. Containerised cargo permits continue to be the major component of the number of SVPs issued. Furthermore, over the last three years there has been approximately a 50 per cent increase in volume in all cargo types.

Details of the SVPs for cargo issued during the September quarter 1998, including a summary table showing the number of SVPs issued by cargo type, will be available shortly on the Department's internet site at http://www.dot.gov.au/.

TABLE 6 SINGLE VOYAGE PERMITS ISSUED AND CARGO CARRIED, JULY–SEPTEMBER 1998

Cargo type	Permits	Tonnes
Petroleum products	14	268100
Crude oil and feedstock	7	269917
Liquefied gas	9	25800
Other bulk liquids	7	35900
Dry bulk	19	788550
General cargo		
- containerised	120	187939
- break bulk	10	8034
Total	186	1584240

Source Maritime Transport Division of the Department of Transport and Regional Services.

CREW TO BERTH RATIOS

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 8 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the BTE is still auditing the data, the September quarter 1998 merchant shipping data in this issue of *Waterline* are classified as preliminary.

The overall crew to berth ratio for merchant shipping rose to 2.137 in the September quarter, compared with 2.102 in the June quarter, and 2.133 in the initial September quarter 1993.

Table 7 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the September quarter. Ship time is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio rose to 1.041 in the September quarter, compared with 1.020 in the June quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35 hour week. The accrued leave ratio rose to 0.972 in the September quarter, compared with 0. 951 in the June quarter.

Other components of the merchant shipping crew to berth ratio were:

- Compensation leave, which fell to 0.052, compared with 0. 060 in the June quarter;
- Long service leave, which rose to 0.035, compared with 0.034 in the June quarter;
- Study leave, which remained constant at 0.031; and
- Training and other paid leave, which fell to 0.006, compared with 0.007 in the June quarter.

Offshore shipping

Figure 9 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. As the BTE is still auditing the data, the September quarter 1998 offshore shipping data in this issue of *Waterline* are classified as preliminary.

The overall crew to berth ratio for offshore shipping fell to 2.317 in the September quarter 1998, compared with 2. 322 in the June quarter, and 2.327 in the initial March quarter 1995.

Table 8 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the September quarter. Accrued leave is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two-crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio for the September quarter rose to 1.154, compared with 1.153 in the June quarter.

Ship time also represents a significant part of the offshore crew to berth ratio and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio for the September quarter was 1.011, compared with 1. 017 in the June quarter.

Other components of the offshore crew to berth ratio, namely, compensation leave, long service leave, study leave, and training and other leave, all remained constant in the September quarter when compared with the June quarter.

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

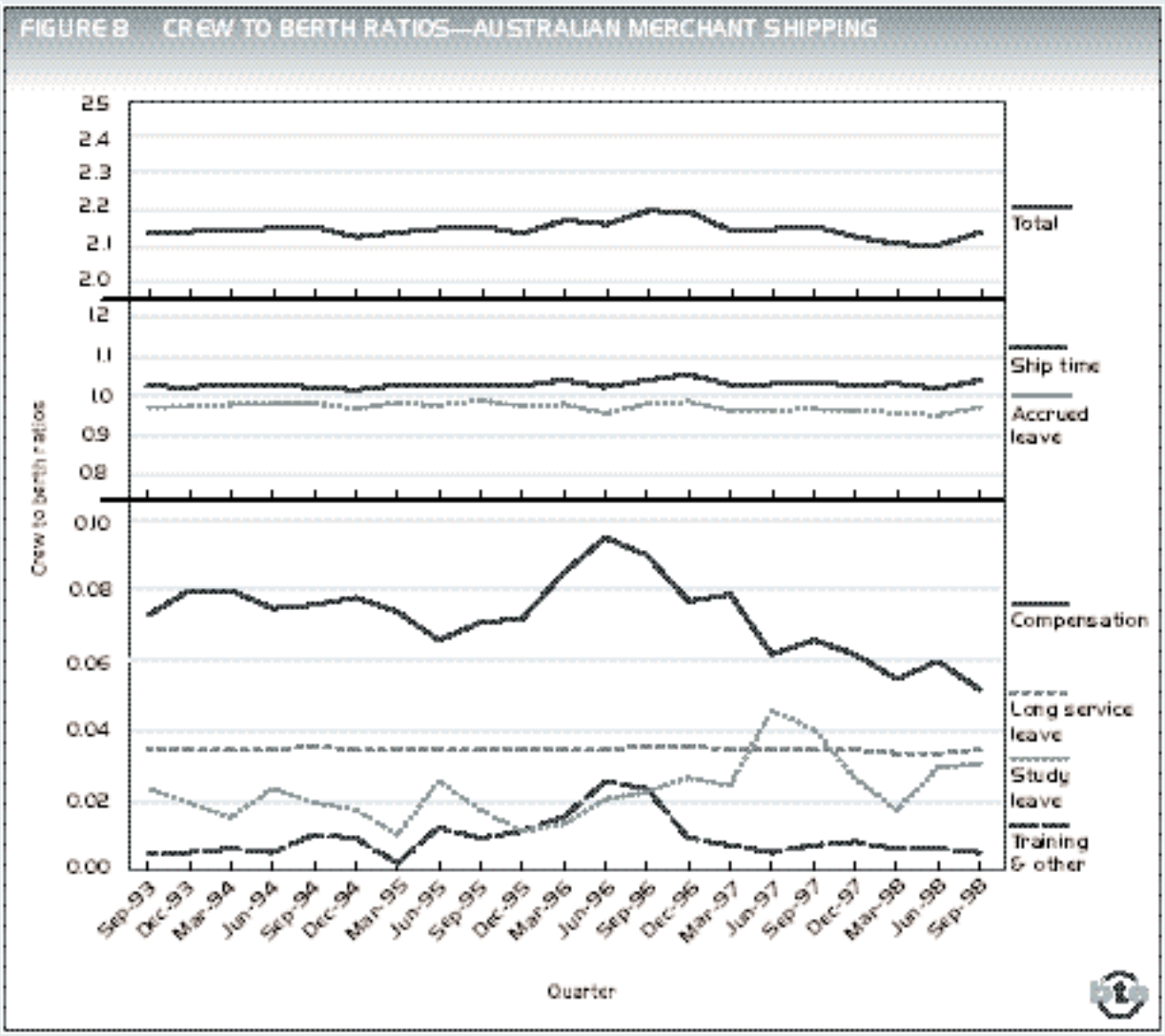


TABLE 7 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1998P

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.052	0.978	0.015	0.035	0.030	0.021	2.131
Engineers	1.051	0.977	0.054	0.036	0.106	0.006	2.231
All officers	1.052	0.978	0.035	0.036	0.069	0.013	2.182
Integrated ratings	1.036	0.970	0.062	0.034	0.000	0.000	2.102
Catering crew	1.025	0.969	0.074	0.034	0.000	0.001	2.094
All ratings	1.032	0.967	0.066	0.034	0.000	0.000	2.100
All crew	1.041	0.972	0.052	0.035	0.031	0.006	2.137
Previous quarter	1.020	0.951	0.060	0.034	0.031	0.007	2.102
Initial level[b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a Components may not sum to totals due to rounding.
b Initial level for September quarter 1998.

Source Data provided by ship operators.

FIGURE 9 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

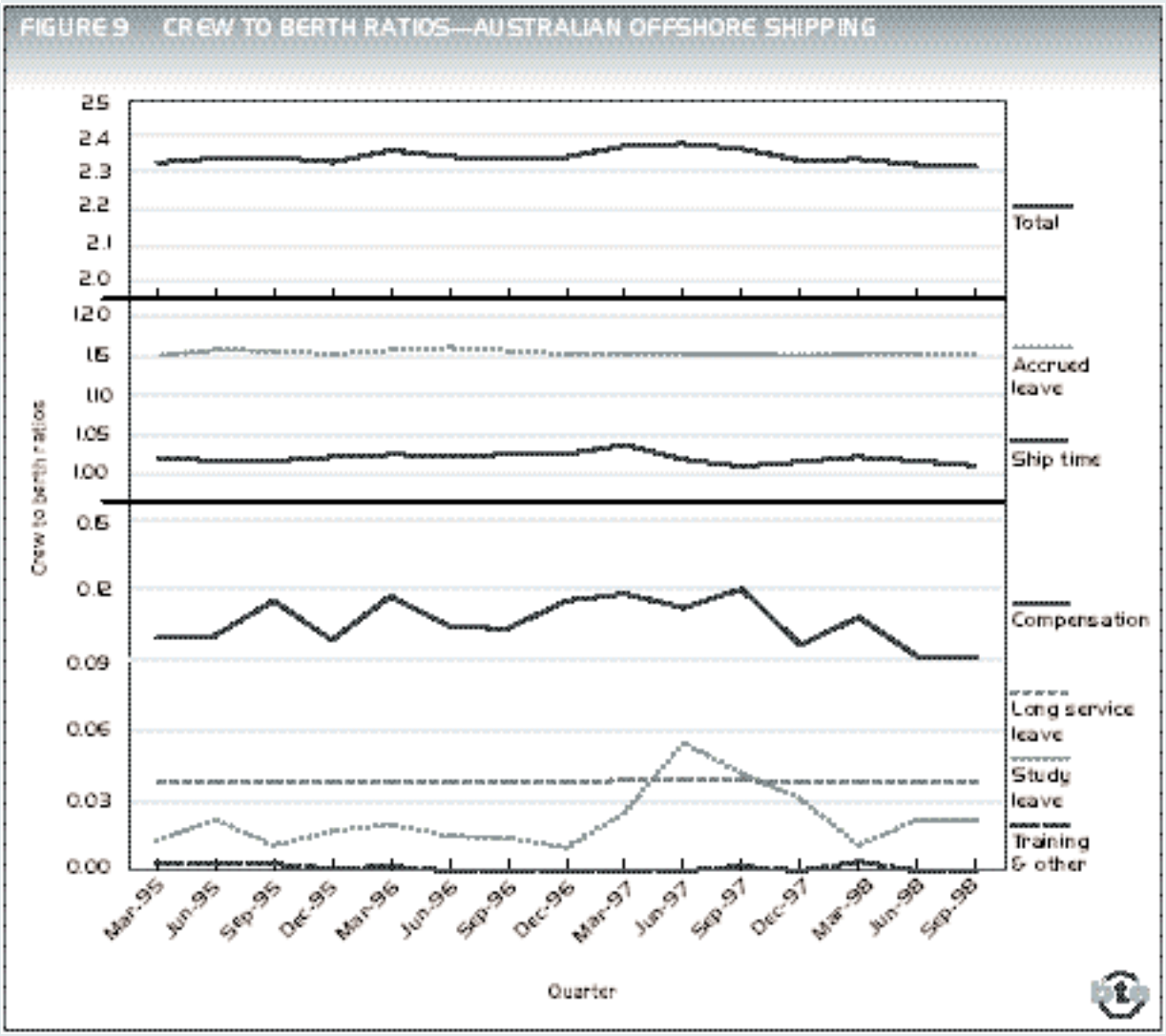


TABLE 8 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1998P

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.099	1.154	0.049	0.037	0.035	0.000	2.285
Engineers	1.010	1.154	0.010	0.037	0.056	0.000	2.268
All officers	1.099	1.154	0.030	0.037	0.046	0.000	2.276
Integrated ratings	1.012	1.154	0.127	0.038	0.000	0.000	2.330
Catering crew	1.022	1.153	0.357	0.042	0.000	0.000	2.575
All ratings	1.013	1.154	0.151	0.039	0.000	0.000	2.357
All crew	1.011	1.154	0.092	0.038	0.022	0.000	2.317
Previous quarter	1.017	1.153	0.092	0.038	0.022	0.000	2.322
Initial level[b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p preliminary
a Components may not sum to totals due to rounding.
b Initial level for March quarter 1995.

Source Data provided by ship operators.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
BTE	Bureau of Transport Economics
IRS	Information and Research Services
MUA	Maritime Union of Australia
SVP	Single Voyage Permit
teu	Twenty-foot equivalent unit

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

Some recent BTE publications

Information Paper 42
COASTAL FREIGHT IN AUSTRALIA, 1995–1996

Information Paper 43
COASTAL FREIGHT IN AUSTRALIA, 1996–1997

Copies available from Fran Antioch, Publications Officer
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Tel: 02 6274 7210

TABLE 9 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—PRODUCTIVITY IN TEUS PER HOUR

	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98
Five ports													
Ships handled	721	728	748	827	871	907	865	891	907	963	909	845	1020
Total teus	433594	425731	411538	440098	497140	519206	441697	483372	549247	585474	527881	514409	633107
Crane rate	19.5	19.2	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4
Elapsed rate	22.5	21.7	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na
Net rate	26.5	25.3	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3
Brisbane													
Ships handled	135	132	124	133	140	141	156	164	162	177	170	168	192
Total teus	58851	46439	39037	51008	66115	62904	47471	65572	73184	71043	58857	74023	87373
Crane rate	18.6	18.9	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5
Elapsed rate	19.5	21.0	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6
Net rate	22.5	24.6	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5
Sydney													
Ships handled	192	203	206	216	228	249	251	249	243	266	238	219	267
Total teus	148431	143746	146038	148290	156344	174982	158323	167705	183978	201535	176496	168234	209619
Crane rate	19.3	18.5	19.5	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6
Elapsed rate	23.4	21.8	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4
Net rate	29.9	25.7	28.0	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0
Melbourne													
Ships handled	221	227	228	262	274	282	230	249	268	281	276	234	309
Total teus	161943	173566	162911	170884	203371	202376	162156	177070	208200	223465	207346	185803	242456
Crane rate	19.8	19.6	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1
Elapsed rate	24.1	22.8	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4
Net rate	26.6	26.4	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9
Adelaide													
Ships handled	34	42	47	63	70	74	69	65	68	66	60	66	63
Total teus	14319	17318	15955	18803	20519	23351	21963	20933	25982	25188	22260	27975	25493
Crane rate	20.9	21.4	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6
Elapsed rate	24.9	26.1	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5
Net rate	26.5	26.7	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0
Fremantle													
Ships handled	139	124	143	153	159	161	159	164	166	173	165	158	189
Total teus	50050	44662	47597	51113	50791	55593	51784	52092	57903	64243	62922	58374	68166
Crane rate	19.5	19.2	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9
Elapsed rate	17.7	15.8	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na
Net rate	21.1	19.8	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2

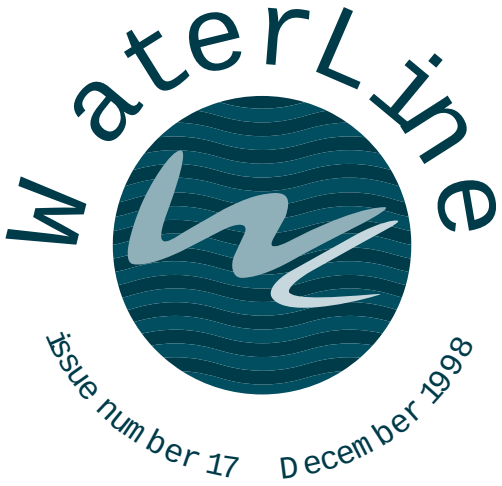
na not available

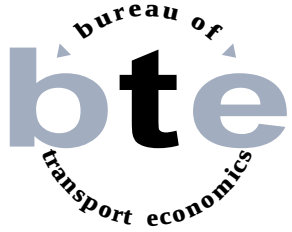
Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator s information systems.

3. For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.





From all of us in the Waterline team

Greetings of the Season and Best Wishes for the Coming Year

ACKNOWLEDGMENTS

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Stevedoring productivity

WaterLine
issue number 18 March 1999

Table 1 presents the December quarter 1996 to December quarter 1998 indicators of stevedoring productivity for the five major Australian container terminals, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to December quarter 1998 period. The data for Brisbane, Sydney, Melbourne and Fremantle are weighted averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal.

Fremantle elapsed rate data from one operator are not available and therefore only a four-port average indicator could be calculated. However, given that the five-port average is dominated by Melbourne and Sydney, the four-port figure calculated is a reasonable approximation of the five-port average.

Overall, national stevedoring productivity, as measured by the five-port average, changed little in the December quarter 1998 compared with the September quarter 1998.

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 18.9 containers per hour for the December quarter compared with 19.1 in the September quarter;
- the four-port (Fremantle data not available) average *elapsed rate* (productivity *per ship* based on the time labour is aboard the ship) was 21.9 containers per hour for the December quarter compared with 20.7 in the September quarter; and
- the five-port average *net rate* (productivity *per ship* while the ship is worked) was 26.9 containers per hour for the December quarter compared with 24.2 containers in the September quarter.

The *Brisbane* average crane rate was 16.8 containers per hour in the December quarter, down from 18.2 in the September quarter. The Brisbane elapsed rate of 19.6 containers per hour and the net rate of 22.9 containers per hour were both up on the September quarter figures. The average proportion of elapsed time not worked decreased marginally to 14.3 per cent.

The *Sydney* average crane rate was 15.7 containers per hour in the December quarter, down from 16.5 in the September quarter. The Sydney elapsed rate of 18.9 containers per hour was down on the September quarter figure whilst the net rate of 24.6 containers per hour was up when compared with the previous quarter. The average proportion of elapsed time not worked increased to 23.1 per cent.

As reported in the media in recent months, *Melbourne* continued to show productivity improvements. The average crane rate was 21.5 containers per hour in the December quarter, up from 20.2 in the September quarter. The Melbourne elapsed rate of 24.3 containers per hour and the net rate of 30.7 containers per hour were both up substantially on the September quarter figures. The crane, elapsed and net rates are the best recorded to date in *Waterline* for Melbourne. Elapsed time not worked increased to 20.7 per cent, which is the highest recorded for Melbourne so far.

This issue of Waterline contains articles on:

The *Adelaide* average crane rate remained unchanged at 23.2 containers per hour in the December quarter. Of Australia's five major container ports, Adelaide continues to retain its edge as the port with the highest crane rate productivity. The Adelaide elapsed rate of 29.3 containers per hour and the net rate of 30.4 containers per hour were both up very slightly on the September quarter figures. The average proportion of elapsed time not worked fell to 3.6 per cent.

The *Fremantle* average crane rate was 20.7 containers per hour in the December quarter, down from 22.2 containers per hour in the September quarter. The elapsed data for September are not available from one operator and therefore the elapsed data for Fremantle have not been produced for this quarter. The net rate of 25.5 containers per hour was up on the September quarter figure.

Container port activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The December quarter 1998 five-port average showed a 7.6 per cent decrease in ship visits and a 3.2 per cent decrease in container throughput when compared with the September quarter. Compared with the December quarter of the previous year the five-port average for container ship visits fell by 2.2 per cent while the five-port average for container throughput rose by 2.3 per cent.

On a port-by-port basis, the December quarter 1998 *container exchange* at:

- Brisbane was down 3.6 per cent on the September quarter figure, and up 16.7 cent when compared with the December quarter 1997;
- Sydney was down 3.1 per cent on the September quarter figure, and down 1.5 per cent when compared with the December quarter 1997;
- Melbourne was down 9.4 per cent on the September quarter figure, and down 4.6 per cent when compared with the December quarter 1997;
- Adelaide was up 22.7 per cent on the September quarter 1998 figure, and up 26.7 per cent when compared with the December quarter 1997; and
- Fremantle was up 8.2 per cent on the September quarter figure, and up 11.4 per cent when compared with the December quarter 1997.

Compared with the September quarter 1993, the first quarter that stevedoring data were collected specifically for *Waterline*, the five-port average for container ship visits has increased by about 38 per cent while the five-port average for container throughput, *measured in teus*, has increased by about 75 per cent.

Teus per hour

Table 12 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purposes of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20 foot and 40 foot containers from one period to the next.

Nevertheless, over the period since monitoring first began in the December quarter 1989, the five-port average crane rate for the December quarter 1998 is just marginally down from the all-time high achieved in the September quarter 1998. And the average net rate for the December quarter 1998 is the highest attained to date.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS— PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	**Dec-96**	**Mar-97**	**Jun-97**	**Sep-97**	**Dec-97**	**Mar-98**	**Jun-98**	**Sep-98**	**Dec-98**
Five ports									
Ships handled	907	865	891	907	963	909	845	1020	942
Total containers	416977	357848	387277	431853	467122	421769	406938	493502	477744
Crane rate	17.1	18.4	18.3	18.3	18.5	18.8	18.7	19.1	18.9
Elapsed rate	na	18.6	19.0	20.4	20.5	20.0[a]	20.7[a]	20.7[a]	21.9[a]
Net rate	21.8	23.4	23.6	24.3	24.3	23.4	24.7	24.2	26.9
Elapsed time not worked (per cent)	na	20.3	19.2	16.2	15.7	14.6[a]	16.2[a]	14.5[a]	18.8[a]
Brisbane									
Ships handled	141	156	164	162	177	170	168	192	180
Total containers	51815	40696	52610	58424	58014	49197	58939	70200	67691
Crane rate	16.9	17.3	16.4	16.1	16.8	18.0	17.3	18.2	16.8
Elapsed rate	17.4	17.3	16.6	16.8	16.8	16.4	17.1	18.7	19.6
Net rate	20.4	19.4	18.7	19.1	19.6	19.1	20.2	21.9	22.9
Elapsed time not worked (per cent)	15.0	10.8	11.5	11.7	14.6	13.9	15.4	14.6	14.3
Sydney									
Ships handled	249	251	249	243	266	238	219	267	230
Total containers	137542	126265	131004	142659	157430	137600	130513	160007	155063
Crane rate	15.4	17.7	17.7	18.2	18.4	17.5	16.9	16.5	15.7
Elapsed rate	na	18.2	18.5	21.7	21.9	19.9	20.2	19.2	18.9
Net rate	22.7	25.7	25.5	27.9	27.7	25.7	26.2	24.2	24.6
Elapsed time not worked (per cent)	na	29.4	27.6	22.4	20.7	22.5	22.9	20.7	23.1
Melbourne									
Ships handled	282	230	249	268	281	276	234	309	274
Total containers	161865	130459	143708	162591	178302	166284	147122	187696	170056
Crane rate	17.8	19.0	19.0	18.6	18.8	19.5	19.2	20.2	21.5
Elapsed rate	17.9	19.5	20.3	20.5	19.9	20.1	21.0	21.8	24.3
Net rate	21.7	23.0	24.0	23.5	22.6	22.7	24.2	24.5	30.7
Elapsed time not worked (per cent)	17.8	15.3	15.4	13.0	11.9	11.6	13.3	11.1	20.7
Adelaide									
Ships handled	74	69	65	68	66	69	66	63	74
Total containers	19047	17486	16874	20974	20773	18163	23293	21444	26319
Crane rate	19.6	19.6	21.0	21.1	21.4	22.5	23.1	23.2	23.2
Elapsed rate	22.6	24.0	28.3	28.4	29.2	29.6	30.4	29.0	29.3
Net rate	23.1	24.6	29.1	29.2	30.1	30.7	31.5	30.3	30.4
Elapsed time not worked (per cent)	2.2	2.4	2.7	2.7	3.0	3.6	3.5	4.3	3.6
Fremantle									
Ships handled	161	159	164	166	173	165	158	189	184
Total containers	46707	42942	43081	47205	52603	50525	47071	54155	58615
Crane rate	18.2	19.4	19.0	18.8	18.9	19.6	21.5	22.2	20.7
Elapsed rate	15.6	16.2	15.9	17.0	18.9	na	na	na	na
Net rate	20.5	20.6	19.8	20.6	23.2	21.1	23.9	23.8	25.5
Elapsed time not worked (per cent)	23.9	21.5	19.5	17.6	18.4	na	na	na	na

na not available

a Four port average only as Fremantle elapsed rate data are not available .

Notes
1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.
2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator s information systems.
3. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 12.
4. Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.

Sources Patrick, P&O Ports and Sea-Land.

FIGURE 1 FIVE MAJOR PORTS

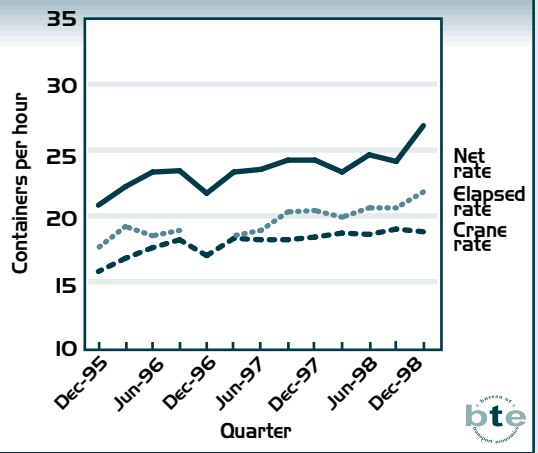


FIGURE 2 BRISBANE

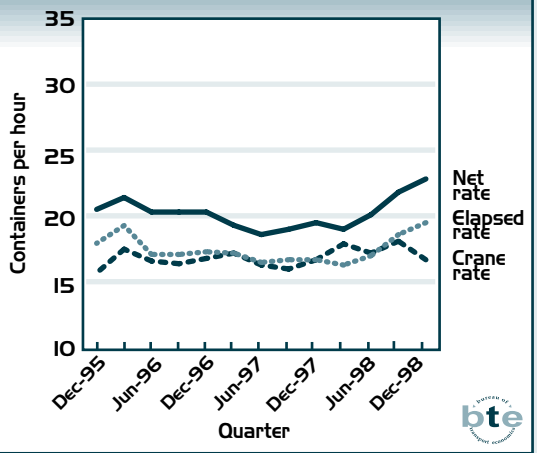


FIGURE 3 SYDNEY

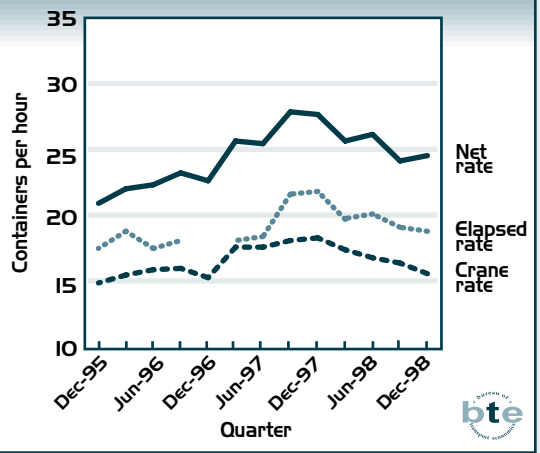


FIGURE 4 MELBOURNE

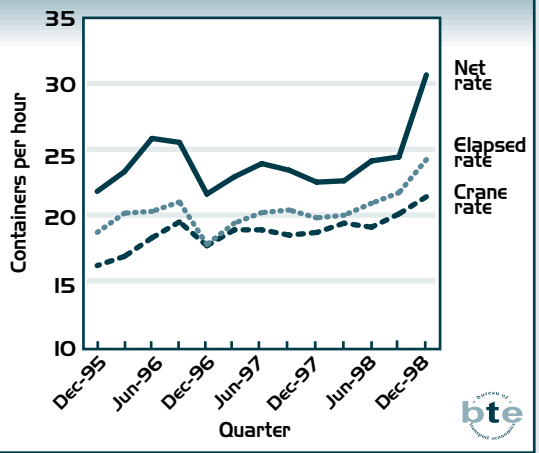


FIGURE 5 ADELAIDE

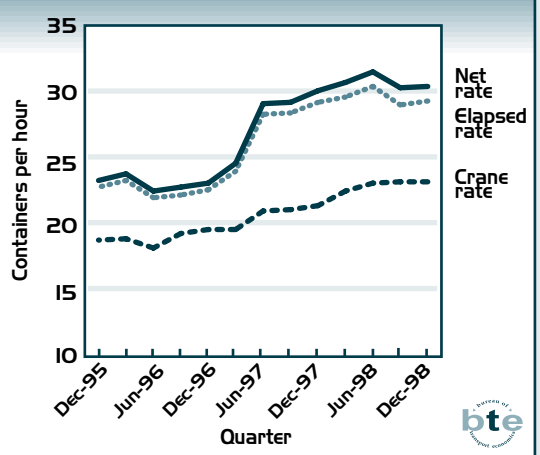
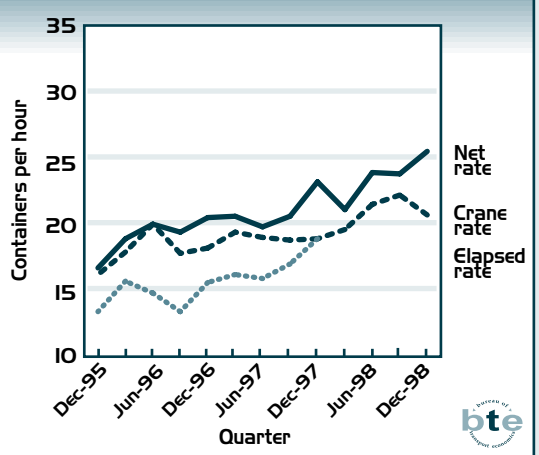


FIGURE 6 FREMANTLE



Note *These figures are based on the data contained in table I. Readers should refer to the notes in that table.*

Sources *Patrick, P&O Ports and Sea-Land.*

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. The indicators cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the December quarter 1998. It indicates the extent to which selected port services were available at the scheduled or confirmed time. The sample for the December quarter covers 259 ship calls, equivalent to 27 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 20 per cent at Brisbane to 32 per cent at Adelaide. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 87 per cent in the December quarter 1998, compared with 91 per cent in the September quarter 1998. Caution should be used in undertaking inter-port comparisons of the berth availability data as there is significant variation between ports in sample sizes and ship call patterns.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, DECEMBER QUARTER 1998

(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5-10	11-20	>20	Total no. of ship calls
Brisbane									
Berth availability	31	1	0	0	1	0	2	1	36
Pilotage	36	0	0	0	0	0	0	0	36
Towage	36	0	0	0	0	0	0	0	36
Sydney									
Berth availability	43	1	2	2	1	8	2	8	67
Pilotage	67	0	0	0	0	0	0	0	67
Towage	67	0	0	0	0	0	0	0	67
Melbourne									
Berth availability	69	0	0	1	1	5	2	3	81
Pilotage	81	0	0	0	0	0	0	0	81
Towage	81	0	0	0	0	0	0	0	81
Adelaide									
Berth availability	18	1	2	0	0	2	1	0	24
Pilotage	24	0	0	0	0	0	0	0	24
Towage	23	1	0	0	0	0	0	0	24
Fremantle									
Berth availability	44	4	2	0	1	0	0	0	51
Pilotage	50	0	0	0	0	1	0	0	51
Towage	51	0	0	0	0	0	0	0	51
Five ports									
Berth availability	265	7	6	3	4	15	7	12	259
Pilotage	258	0	0	0	0	1	0	0	259
Towage	258	1	0	0	0	0	0	0	259

Note Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns.

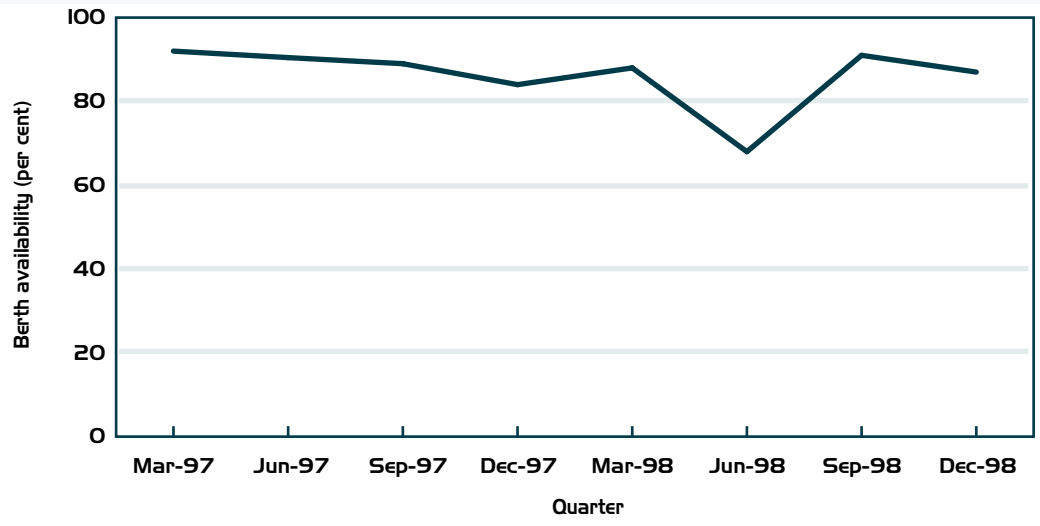
Sources Data for a sample of ship calls provided by shipping lines.

Figure 7 provides information on berth availability over the period since data were first published by the BTE. The indicator has generally ranged between 84 per cent and 92 per cent. However, there was a substantial reduction in berth availability (to 68 per cent) during the Patrick/MUA dispute in the June quarter 1998.

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 19 hours in the December quarter 1998. This compared with a figure of 15 hours recorded during the previous quarter.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportions were virtually 100 per cent in the December quarter 1998. Performance has been consistently at or close to this level since the first data (covering the March quarter 1997) were published in *Waterline*.

FIGURE 7 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997 AND 1998



Sources *Data for a sample of ship calls provided by shipping lines.*

Other waiting time

The seven shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

In the December quarter 1998, 45 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. This was below the proportion of 57 per cent that was recorded in the September quarter 1998. The average duration of other waiting time incidents was 7.8 hours per incident in the December quarter 1998, compared with 9.0 hours per incident in the previous quarter.

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, DECEMBER QUARTER 1998

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5-10	11-20	>20	Total no. of incidents
Awaiting labour	8	8	3	1	13	8	5	46
Early ship arrival	5	5	5	2	10	3	5	35
Stevedoring finished early	3	10	2	2	3	0	0	20
Crane breakdown	7	3	4	3	1	1	0	19
Pilot/tug booking not at preferred time	3	3	1	2	1	0	0	10
Stevedoring finished late	0	0	0	0	4	1	2	7
Late ship arrival	0	1	0	2	2	0	0	5
Industrial action	0	1	0	0	2	1	0	4
Ship repairs or maintenance	0	0	0	0	4	0	0	4
Weather or tides	0	1	1	0	0	0	0	2
Other	2	1	2	0	5	0	3	13
Total incidents	28	33	18	12	45	14	15	165[a]

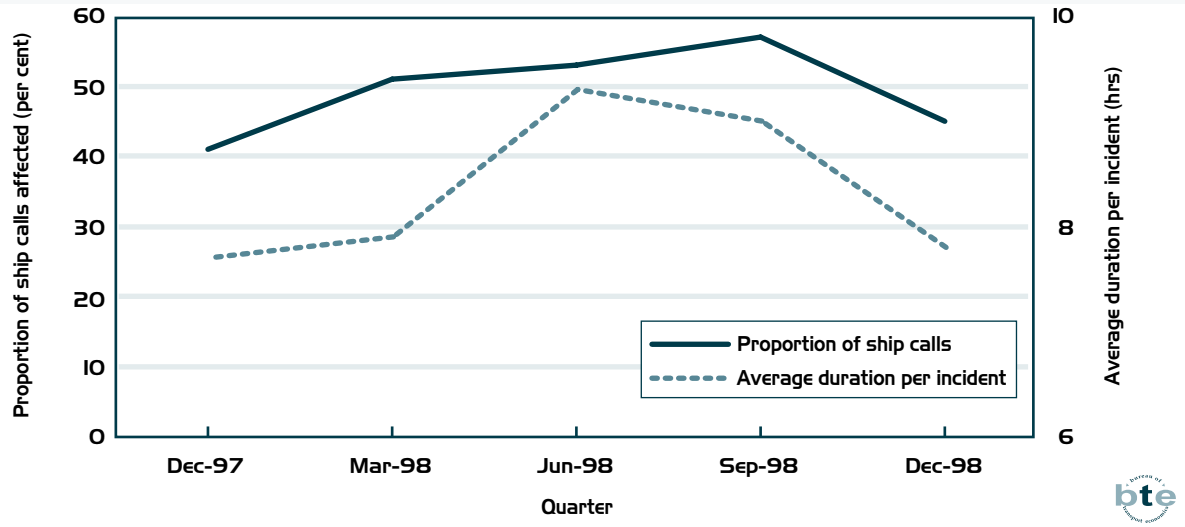
a These incidents affected 117 of the 259 ship calls covered in table 2.

Sources Data for a sample of ship calls provided by shipping lines.

Table 3 summarises the data on other waiting time incidents in the December quarter 1998. The shipping lines identified a total of 165 incidents (affecting 117 ship calls) for the sample of ship calls over this period. Around one-third of the ship calls that incurred other waiting time were affected by two or more incidents.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents.

FIGURE 8 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, 1997 AND 1998



Sources *Data for a sample of ship calls provided by shipping lines.*

In the December quarter 1998, three incident types accounted for around 70 per cent of the total hours attributable to other ship waiting time:

- Awaiting labour (35 per cent);
- Early ship arrival (23 per cent);
- Stevedoring finished late (12 per cent).

Figure 8 provides information on other ship waiting time over the period since the December quarter 1997. The proportion of ship calls affected by other ship waiting time in a particular quarter has varied between 41 per cent and 57 per cent. The average duration of other waiting time incidents has ranged from 7.7 hours to 9.3 hours. The BTE's database indicates that, in individual quarters, there have been 1.3-1.4 incidents (on average) for each ship call affected by other waiting time.

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals – stevedoring rate and cargo receival. Data are not available for Adelaide or Fremantle. As noted in *Waterline* 17, a third indicator (stevedoring completion) is no longer published by the BTE due to major changes in one terminal operator's work practices and recording activities.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. In the December quarter 1998, the stevedoring rate indicator ranged from 52 per cent to 60 per cent at the three ports for which data are available.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container terminal performance. In the December quarter 1998, the cargo receival indicator ranged between 79 per cent and 97 per cent at the three ports for which data are available.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice. The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation at *24 hours prior to actual arrival*. The proportion at the four ports for which data are available ranged between 49 per cent and 63 per cent in the December quarter 1998. The major change from the previous quarter was a significant decline at Brisbane.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. The proportion at the four ports ranged between 90 per cent and 95 per cent in the December quarter 1998.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, SEPTEMBER AND DECEMBER QUARTERS 1998

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec
Stevedoring										
Stevedoring rate	56	57	65	60	na	52	na	na	na	na
Cargo receival	97	90	82	79	97	97	na	na	na	na
Ship arrival										
Advice at 24 hrs	79	57	49	49	na	na	66	63	55	53
Advice inside 24 hrs	96	92	88	94	na	na	94	95	91	90

na not available

Sources AAPMA, Patrick and P&O Ports.

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs (charges) for containers moved through the Australian mainland capital city ports. Data for the periods January-June 1998 and July-December 1998 are presented in tables 5 to 7. 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. The indicative approach was adopted because of the difficulty of obtaining data on the multitude of factors affecting the prices charged by each service provider, particularly for towage and road transport charges, and customs brokers' fees.

Port and related charges

Table 5 provides the parameters used to determine the port and related charges in table 6. These parameters relate to a representative port call by a containership (Lloyd's ship classification UCC). The representative ship was selected from the ship size range with the most port calls by UCC-type ships during the periods covered by *Waterline* earlier in the 1990s. Typically, the ship size range of 15 001 to 20 000 GRT had the most port calls at each port. The other cost parameters are then determined by taking the mean of all port calls in the range that contains the representative ship.

It is important to directly connect the mean number of teus exchanged per port call with the size of the representative ship. This is because most port and related charges, particularly towage and port authority tonnage charges, are dependent upon the size of the ship. However, shipping economics are such that, the larger the ship being used to transport the cargo, the more likely ship operators are to attempt to exchange higher volumes of cargo per port call. As a result, the per unit (teu) cost of exchanging cargo at a particular port remains roughly the same for each port call regardless of the size of the ship. It is for this reason that comparative port charge analyses that keep the cargo exchange constant while varying the ship size are misleading. A discussion of this, in relation to the Port Interface Cost Index, can be found in *Waterline 4*, October 1995, pp. 9-13. That article also demonstrates that the BTE's Port Interface Cost Index is a reasonable approximation of port interface costs for most container movements across the Australian mainland capital city ports.

TABLE 5 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1998

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
Teus exchanged[a]										
Total	347	447	719	858	662	868	327	560	330	363
Loaded	273	346	578	679	553	719	260	427	265	282
Empty	74	101	141	179	109	149	67	133	65	81
Loaded inwards	126	164	358	432	290	389	114	187	139	149
Loaded outwards	147	182	220	247	263	339	146	240	126	133
Ship call parameters[a]										
Number of port calls	3	4	3	3	3	4	3	6	5	7
Elapsed berth time (hrs)	24	26	37	42	38	35	15	20	16	20

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

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

Table 6 provides the port and related charges at the five mainland capital city ports for the periods January-June 1998 and July-December 1998. Port and related charges comprise ship-based charges and cargo-based charges.

Ship-based charges

On a per teu basis, ship-based port and related charges fell at all ports in the July-December 1998 period compared with the January-June 1998 period. This outcome is mainly the result of an increase in the mean number of teus exchanged per port call at all ports and a reduction in the number of tugs required for towage at Brisbane, Melbourne and Fremantle. However, to a lesser extent, changes in the average number of port calls made by the indicative vessel during the period and changes in the elapsed berth time also impacted on the charges in some ports. Only at Melbourne and Fremantle were there any actual changes in ship-based charges:

- a 14 per cent decrease in tonnage charges and a 6 per cent decrease in mooring and unmooring charges at Melbourne; and
- a 0.6 per cent increase in conservancy charges at Fremantle.

On a per ship-call basis, these actual changes in charges contributed 3 per cent towards the decrease in total ship-based charges per ship visit at Melbourne, and a tiny increase of 0.03 per cent at Fremantle which was compensated by the decrease in costs per teu attributable to changes in the tug-usage and average-teus-exchanged parameters. At Brisbane and Adelaide, only changes in the parameters upon which the total ship-based charges per ship visit are calculated were responsible for the apparent decrease in charges. Total ship-based charges per ship visit remained unchanged at Sydney.

At *Brisbane* the 33 per cent fall in ship-based charges per teu resulted from a decrease in tug requirements and an increase in average teus exchanged for the indicative ship range. At *Sydney* the 16 per cent fall in ship-based charges per teu was due solely to an increase in average teus exchanged. At *Melbourne* the 28 per cent fall in ship-based charges per teu resulted from a decrease in tugs required and an increase in average teus exchanged. At *Adelaide* the 42 per cent fall in ship-based charges per teu resulted from an increase in average teus exchanged and an increase in the average number of port calls per ship per period. At *Fremantle* the 38 per cent fall in ship-based charges per teu resulted from a decrease in tugs required, an increase in average teus exchanged and an increase in the average number of port calls per ship.

TABLE 6 PORT AND RELATED CHARGES, 1998

Indicator	Brisbane Jan-Jun 1998	Brisbane Jul-Dec 1998	Sydney Jan-Jun 1998	Sydney Jul-Dec 1998	Melbourne Jan-Jun 1998	Melbourne Jul-Dec 1998	Adelaide Jan-Jun 1998	Adelaide Jul-Dec 1998	Fremantle Jan-Jun 1998	Fremantle Jul-Dec 1998
Ship-based charges ($/teu)										
Conservancy	6.45	5.01	-		-	-	4.60	1.53	2.40	1.46
Tonnage	-	-	9.34	7.82	9.23	6.03	11.34	7.27	7.63	6.97
Pilotage	14.78	11.48	4.73	3.96	8.29	6.32	7.19	4.20	6.34	5.75
Towage	29.17	16.99	13.59	11.39	11.10	7.65	37.63	21.96	29.86	13.55
Mooring, unmooring	4.93	3.83	4.38	3.67	1.51	1.03	-	-	3.34	3.03
Berth hire [a]	-	-	-	-	11.84	9.65	-	-	-	-
Total [b]	55.33	37.31	32.03	26.84	41.97	30.14	69.76	34.96	49.62	30.76
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	69.00	69.00	34.39	33.00	53.00	53.00	47.39	47.39
Exports	26.00	26.00	45.00	45.00	34.39	33.00	53.00	53.00	47.39	47.39
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	13.90	13.90
Total port and related charges ($/teu) [b]										
Loaded imports	123	105	92	87	76	63	114	88	111	92
Loaded exports	123	105	77	72	76	63	114	88	111	92
Charges per ship visit ($/visit)										
Total ship-based charges	19197	16667	23036	23036	27786	26173	19860	19581	16352	11171
Empty teus [c]	1055	1439	1410	1790	1088	596	0	0	501	624

- not applicable
a Charged by stevedores and itemised separately from basic stevedoring charge.
b Components may not sum to totals due to rounding.
c 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 5.

Sources BTCE 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.

While caution should always be used when making port comparisons on a per teu basis, Sydney remains the lowest-cost port for ship-based charges. This is significant from a cargo owner's point of view. However, from the point of view of ship operators using ships similar to the representative ship in table 5, Fremantle remains the lowest cost port for ship-based charges on a per ship-visit basis.

Cargo-based charges

At Melbourne, wharfage for a full teu fell by nearly 4 per cent and for an empty teu by nearly 60 per cent. There were no other changes in port and related cargo-based charges in the July-December 1998 period.

Changes in total port and related charges per teu

At Brisbane, on a per teu basis, total port and related charges fell 15 per cent for both loaded imports and loaded exports for the period July-December 1998. This fall was due to a combination of fewer tugs required per ship movement and a 29 per cent increase in teus exchanged.

At Sydney, on a per teu basis, total port and related charges fell by about 6 per cent for loaded imports and loaded exports in the July-December 1998 period. As there were no changes in any of the port and related costs at Sydney during this period, this decrease demonstrates the impact a 19 per cent increase in the mean teu exchange can have on the per unit charge.

At Melbourne, on a per teu basis, total port and related charges fell 17 per cent for loaded imports and loaded exports for the period July-December 1998. This decrease was the result of a 31 per cent increase in the mean teu exchange and a reduction in both the number of tugs required and wharfage charges.

At Adelaide, on a per teu basis, total port and related charges fell 23 per cent for loaded imports and loaded exports in the July-December 1998 period. This is the fourth consecutive period in which Adelaide's average number of teus exchanged has risen, on each occasion leading to a further reduction in total port and related charges on a per teu basis. This latest decrease in costs per teu was the result of a substantial increase in both the mean teu exchange (71 per cent) and the average number of port calls per ship per period.

At Fremantle, on a per teu basis, total port and related charges fell 17 per cent for loaded imports and loaded exports in the July-December 1998 period. This fall was due to a combination of fewer tugs required and a 10 per cent increase in average teus exchanged for ships in the indicative ship range.

Stevedoring charges per teu

The last ACCC survey of container terminal operations provided a provisional estimate of stevedoring charges of $203 per teu in 1995. For the January-June 1997 period, the BTE contacted a range of shipping lines and terminal operators in an interim attempt to obtain more recent estimates for container stevedoring charges. As a result, it was estimated that average revenue for container stevedoring was approximately 7.5 per cent, or $15, per teu lower than the ACCC's provisional 1995 estimate. This led to a provisional stevedoring charge of $188 being used for the Port Interface Cost Index.

Earlier this year the Commonwealth Treasurer directed the ACCC to undertake a monitoring program of the prices, costs and profits of the container stevedoring companies at the major Australian container ports. Once the results of this survey become available it will allow us to include more up-to-date stevedoring charges in the Port Interface Cost Index.

Land-based charges per teu

The average charges for customs brokers' fees and road transport charges for the January-June 1998 and July-December 1998 Port Interface Cost Index are included in table 7. These charges are based on data provided by approximately 40 customs brokers and 50 road transport operators. Customs brokers' fees for imports are higher than the fee for exports, reflecting the more complex clearance procedures for import containers.

TABLE 7 PORT INTERFACE COSTS, 1998

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998
Imports										
Ship-based charges	55	37	32	27	42	30	61	35	50	31
Cargo-based charges	68	68	60	60	34	33	53	53	61	61
Stevedoring[p]	188	188	188	188	188	188	188	188	188	188
Customs brokers' fees	123	123	152	152	138	138	131	132	143	143
Road transport charges	185	185	288	288	251	251	158	168	195	195
Total imports[a]	620	602	719	714	653	640	591	576	637	618
Exports										
Ship-based charges	55	37	32	27	42	30	61	35	50	31
Cargo-based charges	68	68	45	45	34	33	53	53	61	61
Stevedoring[p]	188	188	188	188	188	188	188	188	188	188
Customs brokers' fees	77	77	111	111	89	89	71	73	70	70
Road transport charges	185	185	288	288	251	251	158	168	195	195
Total exports[a]	574	555	663	658	604	591	532	518	564	545

p provisional pending updating of stevedoring charge using detailed survey data

a Components may not sum to totals due to rounding.

Notes
1 Based on parameters described in table 5.
2 Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.
3 The stevedoring charge used in Waterline is a weighted average for several major Australian ports. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTE 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; andstevedoring charges data supplied by the ACCC and industry sources.

The July-December 1998 period indicated no movement in aggregate customs brokers' fees apart from a rise, in Adelaide, of 1 per cent in import fees and 3 per cent in export fees. Similarly, there was no movement in average road transport charges other than a 6 per cent rise in Adelaide. However, a recurrent comment from many of our Sydney contacts was that waiting time at terminals had increased by up to 3 hours, which understandably increased charges by the standard rate per hour. On this occasion we have not incorporated these extra demurrage costs into our calculations as the index is indicative of average charges for the full six month period and the BTE does not believe, at this stage, that the additional waiting time is widespread. However, should the BTE receive similar reports of delays in our next round of compiling the index, the additional demurrage charges will be incorporated.

One of the parameters used to estimate road transport charges is the time taken to move containers from (to) the wharf to (from) the customer's warehouse. Both distance and traffic congestion impact upon this parameter and help explain, to some extent, the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

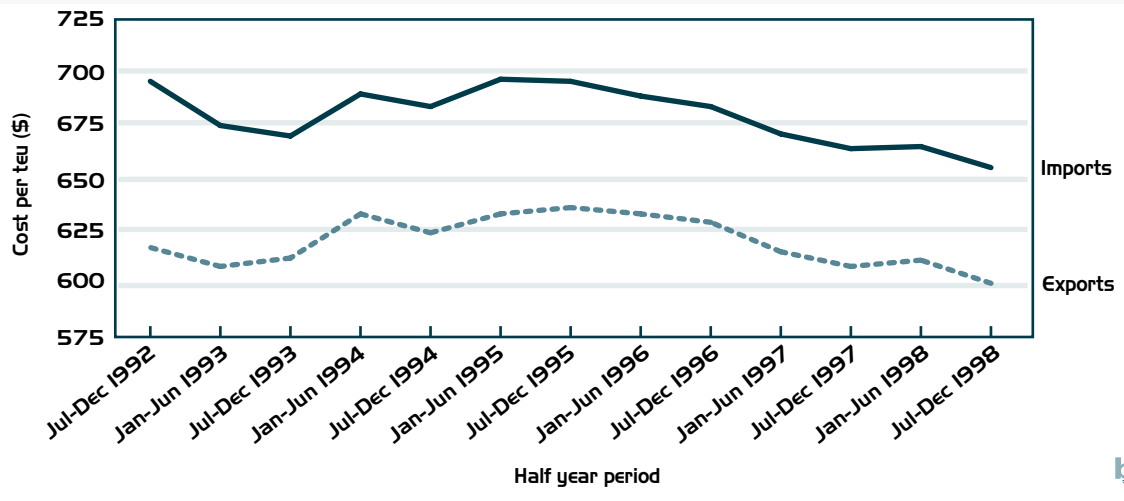
Indices for individual ports

Table 7 indicates that port interface costs per teu fell at all five major container ports in Australia between January-June 1998 and July-December 1998. However, the changes in the port interface cost indices should be interpreted with caution given the provisional nature of the reported stevedoring charges. Even if stevedoring charges did not change during the July-December 1998 period, care should also be taken in making inter-port comparisons of port interface costs. The use of a single stevedoring charge for all ports reflects the scope of the available information which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

National index

Figure 9 provides the National Port Interface Cost Index back to the July-December 1992 period. Between the January-June 1998 and July-December 1998 periods, national import charges decreased by 1.6 per cent to $655 per teu and export charges decreased by 1.8 per cent to $600 per teu. Overall, this fall in national charges was primarily the outcome of a significant increase in the average number of teus exchanged by ships in the indicative range at all ports, together with improved tug operations in three of the five ports.

FIGURE 9 NATIONAL PORT INTERFACE COST INDEX



Sources *BTE 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.*

TABLE 8 FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORT AUTHORITIES/CORPORATIONS, 1996/97 & 1997/98

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	1996/97	1997/98	1996/97	1997/98	1996/97[e]	1997/98	1996/97	1997/98	1996/97	1997/98
					per cent					
Return on assets[a]	6.7	6.3	15.5	12.5	12.7	8.1	19.6	24.5	14.9	20.0
Dividend payout ratio[b]	36.3	25.9	61.3	50.0	27.4	41.7	64.6	23.9	0.0	10.0
Debt/equity[c]	0.1	0.1	102.9	44.4	33.6	25.6	87.6	63.7	109.1[r]	64.9
					$million					
EBIT[d]	28.1	27.2	52.0	54.6	59.6	41.3	23.1	25.8	15.8	22.0
Ave. total assets in service	415.7	429.2	335.4	435.9	469.8	507.7	117.6	105.4	106.1	109.9
Dividends paid	7.3	4.8	14.6	12.7	7.4	8.0	4.0	4.7[f]	0.0	1.3
Operating profit[d]	20.0	18.5	23.8	25.5	27.1	19.2	6.1	19.6	5.0	12.6
Total debt	0.4	0.3	150.6	150.5	114.4	102.5	45.0	35.0	44.2	33.5
Total equity	399.4	409.8	146.4	339.4	340.3	409.3	51.4	55.0	40.5	51.6

r revised
a EBIT (earnings before interest and tax) as a proportion of total assets.
b Dividends paid out as a proportion of operating profit.
c Total debt as a proportion of total equity.
d Includes abnormals.
e These data are based on the Melbourne Port Corporation's audited financial statements for the period 1 March 1996 to 30 June 1997 as published in the 1997 Annual Report.
f A capital dividend of $11.6 million has been excluded.

Source AAPMA.

PORT PERFORMANCE — FINANCIAL

Information on the financial performance of the five mainland capital city port authorities/corporations in 1996/97 and 1997/98 is presented in table 8.

Earnings and assets

Earnings before interest and tax (EBIT) increased in 1997/98 at Sydney Ports Corporation (5 per cent), Ports Corp SA (12 per cent), and Fremantle Port Authority (39 per cent). It fell at Port of Brisbane Corporation (3 per cent) and Melbourne Port Corporation (31 per cent).

Operating profit after income tax in 1997/98 increased by 7 per cent at Sydney Ports Corporation, 220 per cent at Ports Corp SA and 152 per cent at Fremantle Port Authority. It fell by 8 per cent at Port of Brisbane Corporation and 29 per cent at Melbourne Port Corporation.

Average total assets in service in the 1997/98 financial year rose at Port of Brisbane Corporation (3 per cent), Sydney Ports Corporation (30 per cent), Melbourne Port Corporation (8 per cent) and Fremantle Port Authority (4 per cent). During the same period average total assets fell 10 per cent at Ports Corp SA.

Return on assets (EBIT as a proportion of total assets) increased in 1997/98 at Ports Corp SA (25 per cent) and at Fremantle Port Authority (35 per cent). The return on assets in 1997/98 decreased at Port of Brisbane Corporation (6 per cent), Sydney Ports Corporation (19 per cent) and Melbourne Port Corporation (36 per cent).

Dividends

Dividends paid in 1997/98 increased at Melbourne Port Corporation (8 per cent) and Ports Corp SA (18 per cent) but fell at Port of Brisbane Corporation (34 per cent) and Sydney Ports Corporation (12 per cent). No dividend was paid by the Fremantle Port Authority in 1996/97.

The *dividend payout ratio* (dividends paid out as a proportion of operating profit) in 1997/98 rose at Melbourne Port Corporation (52 per cent). It fell at the Brisbane (29 per cent), Sydney (18 per cent) and South Australia (63 per cent) port corporations.

Debt and equity

Total debt in 1997/98 decreased at all five port authorities/corporations: 22 per cent at Brisbane, 0.1 per cent at Sydney, 10 per cent at Melbourne, 22 per cent at South Australia and 24 per cent at Fremantle.

Total equity in 1997/98 increased at all five port authorities/corporations: 3 per cent at Brisbane, 132 per cent at Sydney, 18 per cent at Melbourne, 7 per cent at South Australia and 27 per cent at Fremantle.

The *debt/equity ratio* fell at all five port authorities/corporations: 24 per cent at Brisbane, 57 per cent at Sydney, 24 per cent at Melbourne, 27 per cent at South Australia and 41 per cent at Fremantle.

PORT PERFORMANCE — NON-FINANCIAL

Non-financial indicators for the five mainland capital city ports in 1998 are presented in table 9. The January-June 1998 indicators include the period of the major industrial dispute between Patrick and the MUA and therefore it is difficult to compare the January-June 1998 figures with earlier or later published indicators for the individual ports.

Cargo throughput

Total cargo throughput at the five ports increased to 46.7 million tonnes in the July-December 1998 period, compared with 45.2 million tonnes in the January-June 1998 period. There were increases in throughput at Sydney (4 per cent), Melbourne (14 per cent), and Fremantle (5 per cent); and decreases at Brisbane (6 per cent) and Adelaide (7 per cent). Overall this resulted in a rise of 3 per cent in total throughput for the five ports compared with the previous half year, and a rise of 7 per cent when compared with the same half-year period of the previous year.

The tonnage of *non-containerised general cargo* handled at the five ports rose by 2 per cent to 2.42 million tonnes in the July-December 1998 period (2.38 million tonnes in the January-June 1998 period). This result was achieved through increases at Melbourne (11 per cent), Adelaide (12 per cent) and Fremantle (9 per cent); and falls at Brisbane (7 per cent) and Sydney (19 per cent). The non-containerised general cargo throughput for the five ports in the July-December 1998 period represents a 4 per cent decrease when compared with the same half-year period in 1997.

Measured in teus, *container traffic* for the five ports rose by 14 per cent to 1.4 million teus in the July-December 1998 period (1.2 million teus in January-June 1998). Throughput of loaded teus rose by 12 per cent, with loaded imports increasing by 16 per cent and loaded exports increasing 9 per cent. During the July-December 1998 period throughput of loaded containers increased at all ports: Brisbane (7 per cent), Sydney (17 per cent), Melbourne (13 per cent), Adelaide (2 per cent) and Fremantle (7 per cent).

The annual 1998 five-ports total container traffic, measured in teus, increased by 8 per cent when compared with 1997.

TABLE 9 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1998

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five ports[d]	
Indicator	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998	Jan-Jun 1998	Jul-Dec 1998
Total cargo throughput ('000 tonnes)	10700	10082	10969	11435	9334	10649	3075	2848	11142	11727	45220	46741
Non-containerised general cargo ('000 tonnes)[a]	517	481	385	310	991	1100	118	132	366	399	2376	2422
Containerised cargo (teus exchanged)												
Full import	57082	62980	189423	226977	217602	254315	19454	19744	53984	58041	537545	622057
Empty import	22450	24630	7504	9159	30878	35220	7855	8209	11134	15313	79821	92531
Full export	66838	70168	116244	129669	197025	215915	24730	25365	48819	51833	453656	492950
Empty export	11412	14388	66857	84751	50596	62293	3582	5781	14098	16205	146545	183418
Total	157782	172166	380028	450556	496101	567743	55621	59099	128035	141392	1217567	1390956
Average total employment[b]	152	na	200	192	70	73	167	167	184	180	773	na
Turnaround time (hrs)[c]												
Median result	36	35	36	43	44	36	20	21	24	23	-	-
95th percentile	97	69	73	77	132	66	57	48	58	51	-	-

- not applicable
na not available
a Excludes bulk cargoes.
b Comparisons between ports are not appropriate since each port authority/corporation has a different structure.
c Turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.
d Components may not sum to totals due to rounding.

Source AAPMA.

CREW TO BERTH RATIOS

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 10 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the BTE is still auditing the data, the December quarter 1998 merchant shipping data in this issue of Waterline are classified as preliminary. The overall crew to berth ratio for merchant shipping fell to 2.108 in the December quarter 1998, compared with 2.137 in the September quarter (a 1.4 per cent decrease) and 2.133 in the initial September quarter 1993 (a 1.2 per cent decrease). This represents the third lowest total merchant shipping figure since the crew to berth monitoring began. The two lower ratio totals occurred in the March and June quarters 1998.

Table 10 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the December quarter 1998. Ship time is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio fell to 1.035 in the December quarter, compared with 1.041 in the September quarter.

FIGURE 10 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

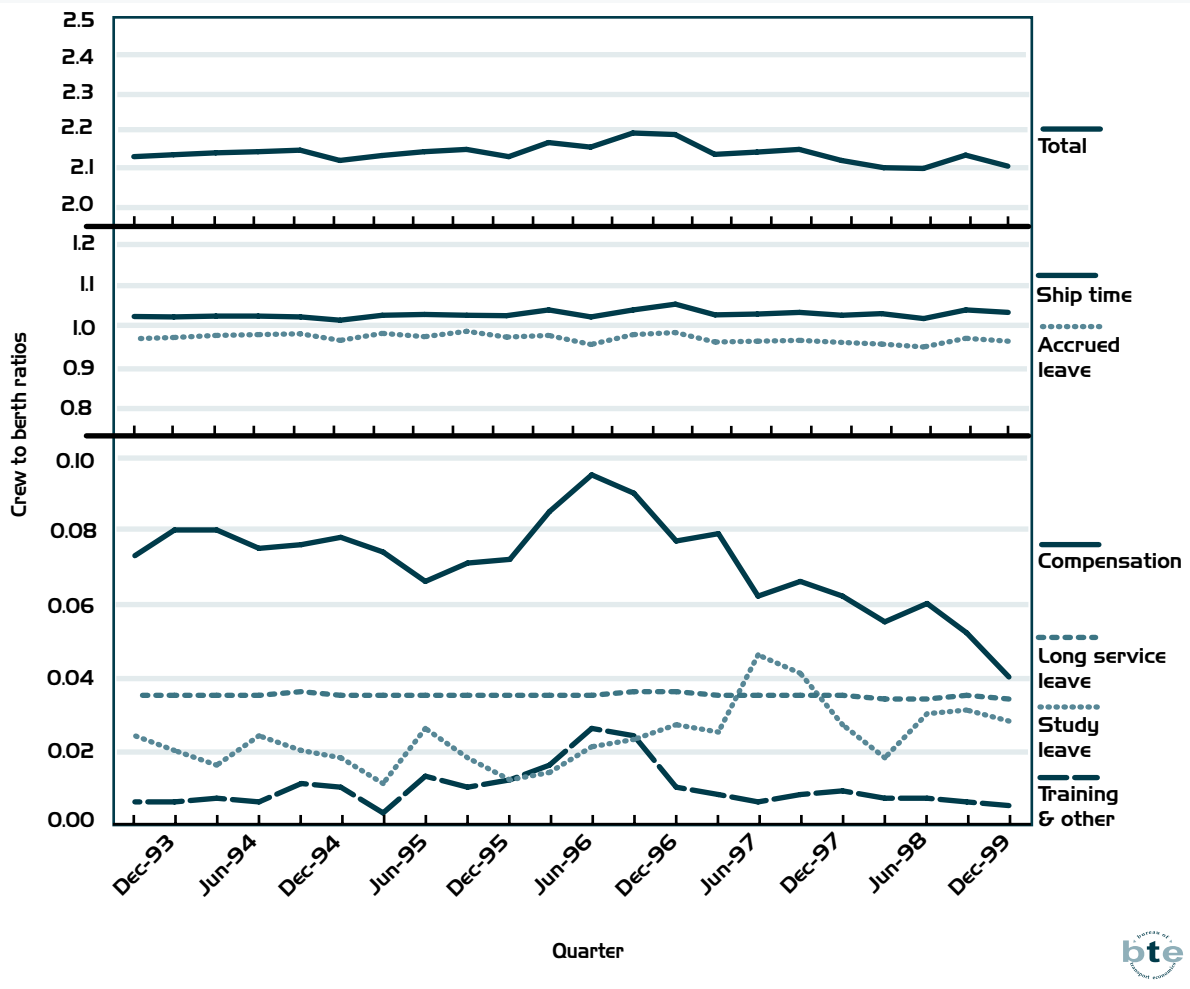


TABLE 10 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1998[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.062	0.986	0.019	0.035	0.029	0.012	2.142
Engineers	1.054	0.977	0.035	0.036	0.090	0.008	2.200
All officers	1.058	0.981	0.027	0.036	0.060	0.010	2.172
Integrated ratings	1.015	0.951	0.050	0.034	0.000	0.001	2.051
Catering crew	1.017	0.951	0.052	0.034	0.000	0.001	2.054
All ratings	1.016	0.951	0.050	0.034	0.000	0.001	2.052
All crew	1.035	0.965	0.040	0.034	0.028	0.005	2.108
Previous quarter	1.041	0.972	0.052	0.035	0.031	0.006	2.137
Initial level [b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a Components may not sum to totals due to rounding.
b Initial level for September quarter 1998.

Source Data provided by ship operators.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35 hour week. The accrued leave ratio fell to 0.965 in the December quarter, compared with 0.972 in the September quarter.

Other components of the merchant shipping crew to berth ratio were:

- compensation leave, which fell to 0.040, compared with 0.052 in the September quarter (This represents a fall of 45.5 per cent since the initial September quarter 1993 merchant shipping monitoring period.);
- long service leave, which fell to 0.034, compared with 0.035 in the September quarter;
- study leave, which fell to 0.028 compared with 0.031 in the September quarter; and
- training and other paid leave, which fell to 0.005 compared with 0.006 in the September quarter.

Offshore shipping

Figure 11 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. As the BTE is still auditing the data, the December quarter 1998 offshore shipping data in this issue of Waterline are classified as preliminary. The overall crew to berth ratio for offshore shipping fell to 2.299 in the December quarter 1998, compared with 2.317 in the September quarter 1998 (a 0.8 per cent decrease), and 2.327 in the initial March quarter 1995 (a 1.7 per cent decrease). The December quarter 1998 ratio total is the lowest to date.

Table 11 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the December quarter 1998. Accrued leave is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio for the December quarter fell to 1.153, compared with 1.154 in the September quarter.

Ship time also represents a significant part of the offshore crew to berth ratio and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio for the December quarter remained constant at 1.011 when compared with the September quarter.

Other components of the offshore crew to berth ratio were:

- compensation leave, which fell to 0.070, compared with 0.092 in the September quarter (This represents a fall of 30.7 per cent since the initial March quarter 1995 offshore shipping monitoring period.);
- long service leave, which remained constant at 0.038;
- study leave, which rose to 0.026, compared with 0.022 in the September quarter; and
- training and other leave, which rose to 0.001, compared with 0.000 in the September quarter.

Erratum

In the December 1998 issue of *Waterline* (p. 2), the standard shipping container was stated as measuring "20 feet long by 8.5 feet square". This information was incorrect. According to International Standards Organisation (ISO) figures published in *Containerisation International Yearbook 1998* (p. 750), the standard length of a 20 foot container is 19 feet 10.5 inches with a standard width of 8 feet. Furthermore, the ISO quotes three standard heights for a 20 foot container; 8 feet 6 inches, 8 feet and less than 8 feet.

While the "8.5 feet square" was an editorial oversight, we wonder how many of our readers are aware that a standard 20 foot container is not quite 20 feet long.

FIGURE II CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

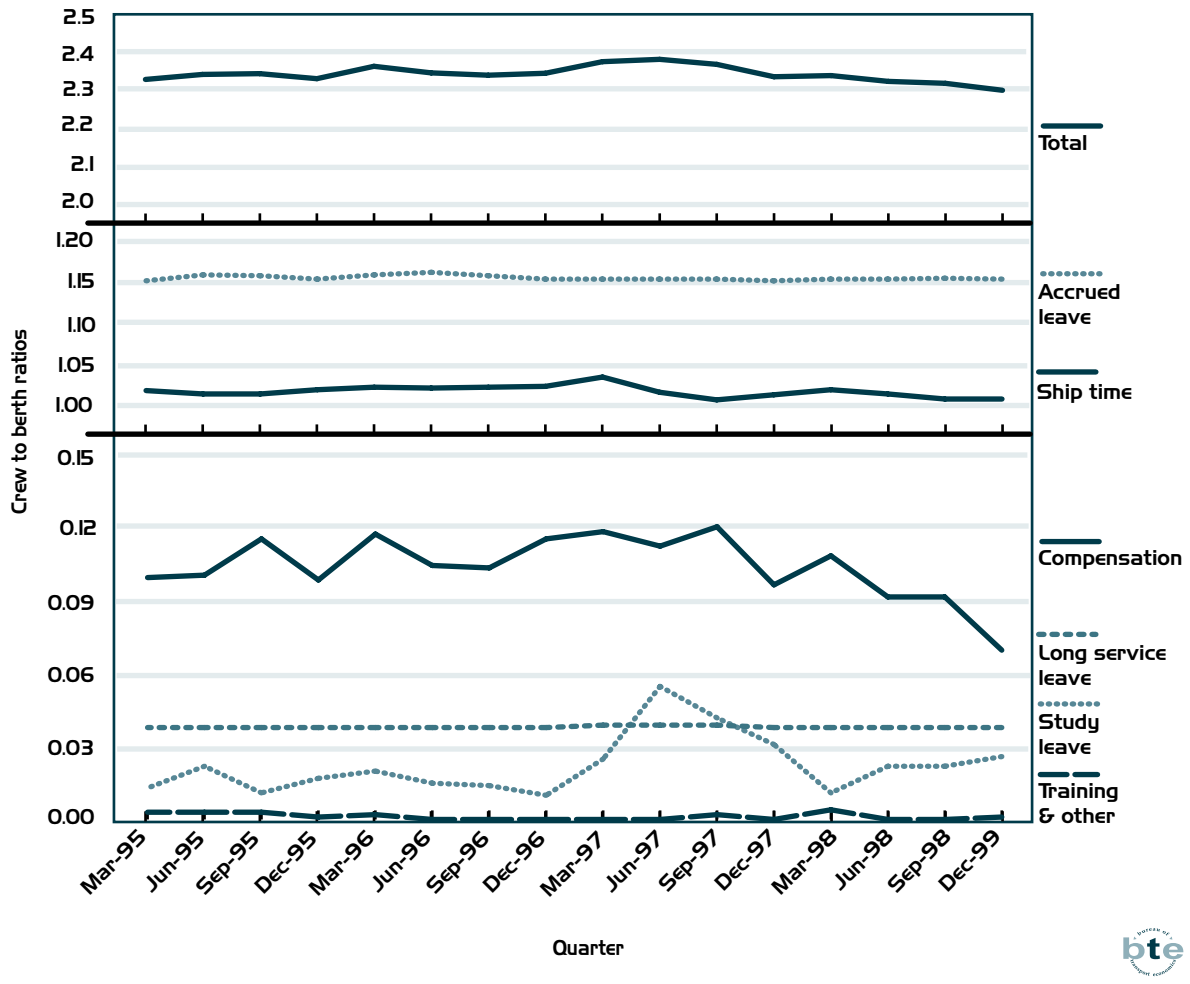


TABLE II OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1998[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.009	1.153	0.060	0.038	0.048	0.000	2.308
Engineers	1.010	1.153	0.017	0.037	0.063	0.003	2.283
All officers	1.009	1.153	0.039	0.038	0.055	0.002	2.296
Integrated ratings	1.009	1.153	0.077	0.037	0.000	0.001	2.277
Catering crew	1.027	1.153	0.205	0.040	0.000	0.003	2.427
All ratings	1.012	1.153	0.098	0.038	0.000	0.001	2.302
All crew	1.011	1.153	0.070	0.038	0.026	0.001	2.299
Previous quarter	1.011	1.154	0.092	0.038	0.022	0.000	2.317
Initial level [b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p preliminary
a Components may not sum to totals due to rounding.
b Initial level for March quarter 1995.

Source Data provided by ship operators.

TABLE 12 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—PRODUCTIVITY IN TEUS PER HOUR

	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98
Five ports													
Ships handled	728	748	827	871	907	865	891	907	963	909	845	1020	942
Total teus	425731	411538	440098	497140	519206	441697	483372	549247	585474	527881	514409	633107	612019
Crane rate	19.2	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2
Elapsed rate	21.7	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na
Net rate	25.3	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7
Brisbane													
Ships handled	132	124	133	140	141	156	164	162	177	170	168	192	180
Total teus	46439	39037	51008	66115	62904	47471	65572	73184	71043	58857	74023	87373	84200
Crane rate	18.9	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9
Elapsed rate	21.0	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7
Net rate	24.6	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7
Sydney													
Ships handled	203	206	216	228	249	251	249	243	266	238	219	267	230
Total teus	143746	146038	148290	156344	174982	158323	167705	183978	201535	176496	168234	209619	203042
Crane rate	18.5	19.5	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4
Elapsed rate	21.8	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8
Net rate	25.7	28.0	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3
Melbourne													
Ships handled	227	228	262	274	282	230	249	268	281	276	234	309	274
Total teus	173566	162911	170884	203371	202376	162156	177070	208200	223465	207346	185803	242456	219549
Crane rate	19.6	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7
Elapsed rate	22.8	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7
Net rate	26.4	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7
Adelaide													
Ships handled	42	47	63	70	74	69	65	68	66	60	66	63	74
Total teus	17318	15955	18803	20519	23351	21963	20933	25982	25188	22260	27975	25493	32556
Crane rate	21.4	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7
Elapsed rate	26.1	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2
Net rate	26.7	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6
Fremantle													
Ships handled	124	143	153	159	161	159	164	166	173	165	158	189	184
Total teus	44662	47597	51113	50791	55593	51784	52092	57903	64243	62922	58374	68166	72672
Crane rate	19.2	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7
Elapsed rate	15.8	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na
Net rate	19.8	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7

na not available

Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

3. For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ACCC	Australian Competition and Consumer Commission
BTE	Bureau of Transport Economics
GRT	Gross Registered Tonnage
MUA	Maritime Union of Australia
NRT	Net Registered Tonnage
teu	Twenty-foot equivalent unit

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate—the number of containers or teus moved per elapsed hour.

Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

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Stevedoring productivity

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Table 1 presents the March quarter 1997 to March quarter 1999 indicators of stevedoring productivity for the five major Australian container terminals, expressed in container moves per hour. Figures 1 to 6 present these data over the December quarter 1995 to March quarter 1999 period. The data for Brisbane, Sydney, Melbourne and Fremantle are weighted averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal.

Overall, national stevedoring productivity, as measured by the five-port average, improved in the March quarter 1999 compared with the December quarter 1998. The March quarter 1999 five-port average rates are the highest achieved to date.

- the five-port average crane rate (productivity per crane while the ship is worked) was 19.9 containers per hour for the March quarter compared with 18.9 in the December quarter;
- the four-port average elapsed rate (productivity per ship based on the time labour is aboard the ship) was 23.1 containers per hour for the March quarter compared with 21.9 in the December quarter. (Fremantle elapsed rate data from one operator are not available, and therefore only a four-port average indicator could be calculated. However, given that the five-port average is dominated by Melbourne and Sydney, the four-port figure calculated is a reasonable approximation of the five-port average); and
- the five-port average net rate (productivity per ship while the ship is worked) was 28.2 containers per hour for the March quarter compared with 26.9 in the December quarter.

The Brisbane average crane rate was 18.3 containers per hour in the March quarter, up from 16.8 in the December quarter. The Brisbane elapsed rate of 21.2 containers per hour and the net rate of 24.7 containers per hour were both up on the December quarter figures. The average proportion of elapsed time not worked remained steady at approximately 14 per cent.

The Sydney average crane rate was 17.7 containers per hour in the March quarter, up from 15.7 in the December quarter. The Sydney elapsed rate of 22.6 containers per hour and the net rate of 29.5 containers per hour were both notably up on the December quarter figures. The average proportion of elapsed time not worked remained steady at approximately 23 per cent.

Articles in this issue

The Melbourne average crane rate remained unchanged at 21.5 containers per hour in the March quarter compared with the December quarter. The Melbourne elapsed rate of 23.6 containers per hour and the net rate of 28.8 containers per hour were both down on the December quarter figures. The average proportion of elapsed time not worked decreased from approximately 21 per cent to approximately 18 per cent.

The Adelaide average crane rate remained unchanged at 23.2 containers per hour for the third consecutive quarter. Of Australia's five major container ports, Adelaide continues to retain its productivity edge as the port with the highest average crane rate. The Adelaide elapsed rate of 28.5 containers per hour was down on the December quarter, while the net rate of 30.7 containers per hour was marginally up compared with the previous quarter. The average proportion of elapsed time not worked increased from approximately 4 per cent to approximately 7 per cent, the highest recorded to date for Adelaide.

The Fremantle average crane rate was 21.4 containers per hour in the March quarter, up from 20.7 containers per hour in the December quarter. The P&O Ports elapsed data for March are not available and therefore the elapsed data for Fremantle have not been produced for this quarter. The net rate of 25.6 containers per hour was up very marginally on the December quarter figure.

Container Port Activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The March quarter 1999 five-port average showed ship visits remained unchanged whilst container throughput fell by 6.2 per cent compared with the December quarter. Compared with the March quarter of the previous year the five-port average for container ship visits rose by 3.6 per cent while the five-port average for container throughput rose by 6.3 per cent.

On a port-by-port basis, the March quarter 1999 container exchange at:

- Brisbane was down 9.6 per cent on the December quarter figure, and up 24.4 per cent compared with the March quarter 1998;
- Sydney was down 7.9 per cent on the December quarter figure, and up 3.8 per cent compared with the March quarter 1998;
- Melbourne was down 4.8 per cent on the December quarter figure, and down 2.6 per cent compared with the March quarter 1998;
- Adelaide was down 8.0 per cent on the December quarter 1998 figure, and up 33.4 per cent compared with the March quarter 1998; and
- Fremantle was down 0.8 per cent on the December quarter figure, and up 15.1 per cent compared with the March quarter 1998.

In considering the above figures one should keep in mind that the March quarter is traditionally a lower volume period for container movements in Australia.

Teus per hour

Table 9 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in Waterline for the purpose of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20 foot and 40 foot containers from one period to the next.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS— PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	**Mar-97**	**Jun-97**	**Sep-97**	**Dec-97**	**Mar-98**	**Jun-98**	**Sep-98**	**Dec-98**	**Mar-99**
Five ports									
Ships handled	865	891	907	963	909	845	1020	942	942
Total containers	357848	387277	431853	467122	421769	406938	493502	477744	448224
Crane rate	18.4	18.3	18.3	18.5	18.8	18.7	19.1	18.9	19.9
Elapsed rate	18.6	19.0	20.4	20.5	20.0[a]	20.7[a]	20.7[a]	21.9[a]	23.1[a]
Net rate	23.4	23.6	24.3	24.3	23.4	24.7	24.2	26.9	28.2
Elapsed time not worked (per cent)	20.3	19.2	16.2	15.7	14.6[a]	16.2[a]	14.5[a]	18.8[a]	17.9[a]
Brisbane									
Ships handled	156	164	162	177	170	168	192	180	176
Total containers	40696	52610	58424	58014	49197	58939	70200	67691	61204
Crane rate	17.3	16.4	16.1	16.8	18.0	17.3	18.2	16.8	18.3
Elapsed rate	17.3	16.6	16.8	16.8	16.4	17.1	18.7	19.6	21.2
Net rate	19.4	18.7	19.1	19.6	19.1	20.2	21.9	22.9	24.7
Elapsed time not worked (per cent)	10.8	11.5	11.7	14.6	13.9	15.4	14.6	14.3	14.4
Sydney									
Ships handled	251	249	243	266	238	219	267	230	221
Total containers	126265	131004	142659	157430	137600	130513	160007	155063	142767
Crane rate	17.7	17.7	18.2	18.4	17.5	16.9	16.5	15.7	17.7
Elapsed rate	18.2	18.5	21.7	21.9	19.9	20.2	19.2	18.9	22.6
Net rate	25.7	25.5	27.9	27.7	25.7	26.2	24.2	24.6	29.5
Elapsed time not worked (per cent)	29.4	27.6	22.4	20.7	22.5	22.9	20.7	23.1	23.5
Melbourne									
Ships handled	230	249	268	281	276	234	309	274	271
Total containers	130459	143708	162591	178302	166284	147122	187696	170056	161894
Crane rate	19.0	19.0	18.6	18.8	19.5	19.2	20.2	21.5	21.5
Elapsed rate	19.5	20.3	20.5	19.9	20.1	21.0	21.8	24.3	23.6
Net rate	23.0	24.0	23.5	22.6	22.7	24.2	24.5	30.7	28.8
Elapsed time not worked (per cent)	15.3	15.4	13.0	11.9	11.6	13.3	11.1	20.7	18.1
Adelaide									
Ships handled	69	65	68	66	60	66	63	74	73
Total containers	17486	16874	20974	20773	18163	23293	21444	26319	24221
Crane rate	19.6	21.0	21.1	21.4	22.5	23.1	23.2	23.2	23.2
Elapsed rate	24.0	28.3	28.4	29.2	29.6	30.4	29.0	29.3	28.5
Net rate	24.6	29.1	29.2	30.1	30.7	31.5	30.3	30.4	30.7
Elapsed time not worked (per cent)	2.4	2.7	2.7	3.0	3.6	3.5	4.3	3.6	7.2
Fremantle									
Ships handled	159	164	166	173	165	158	189	184	201
Total containers	42942	43081	47205	52603	50525	47071	54155	58615	58138
Crane rate	19.4	19.0	18.8	18.9	19.6	21.5	22.2	20.7	21.4
Elapsed rate	16.2	15.9	17.0	18.9	na	na	na	na	na
Net rate	20.6	19.8	20.6	23.2	21.1	23.9	23.8	25.5	25.6
Elapsed time not worked (per cent)	21.5	19.5	17.6	18.4	na	na	na	na	na

na not available

a. Four-port average only as Fremantle elapsed rate data are not available.

Notes
1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.
2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.
3. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 9.
4. Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.

Sources Patrick, P&O Ports and Sea-Land.

FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE

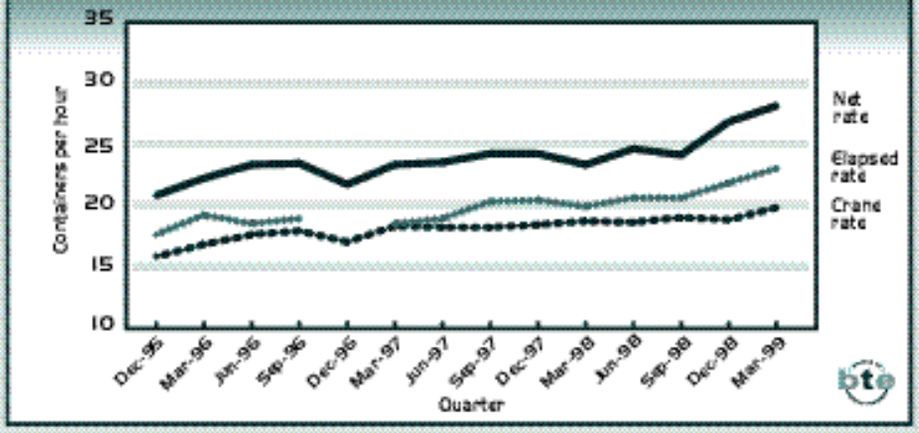


FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE

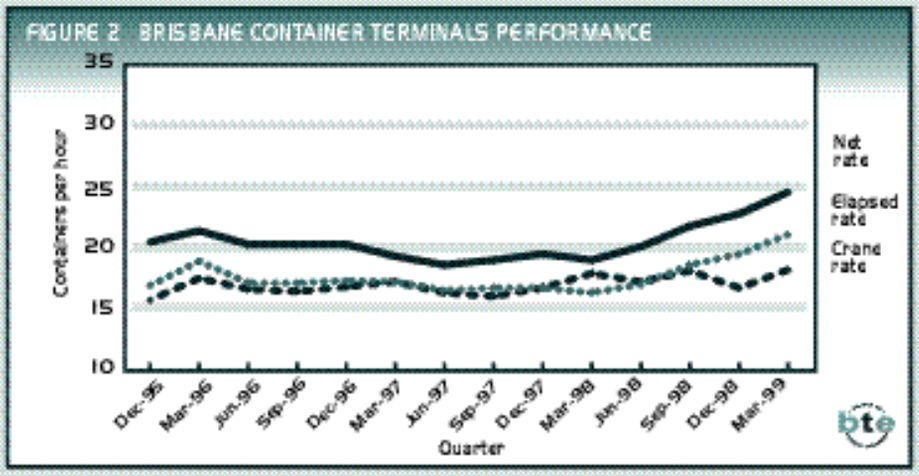
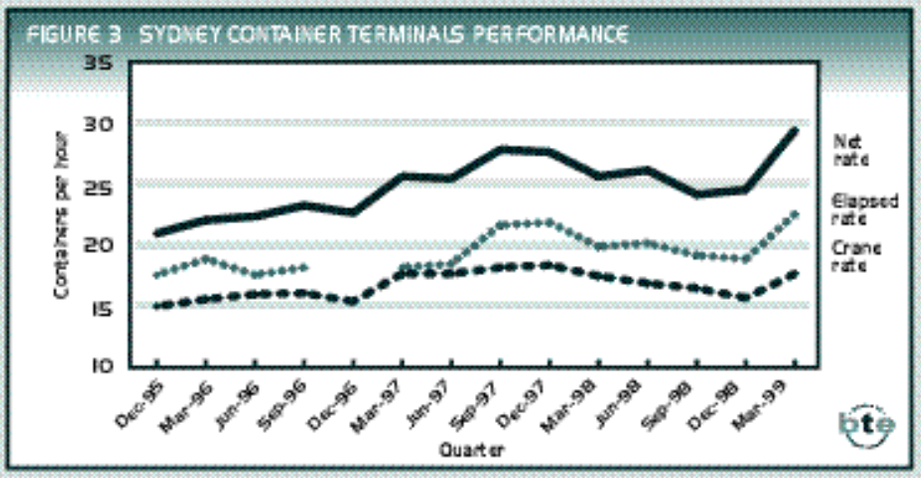


FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE



Note These figures are based on the data contained in table 1. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE

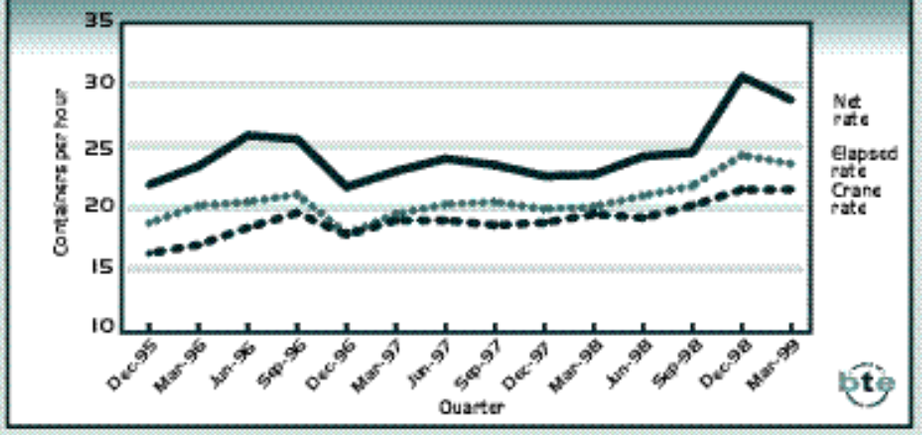


FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE

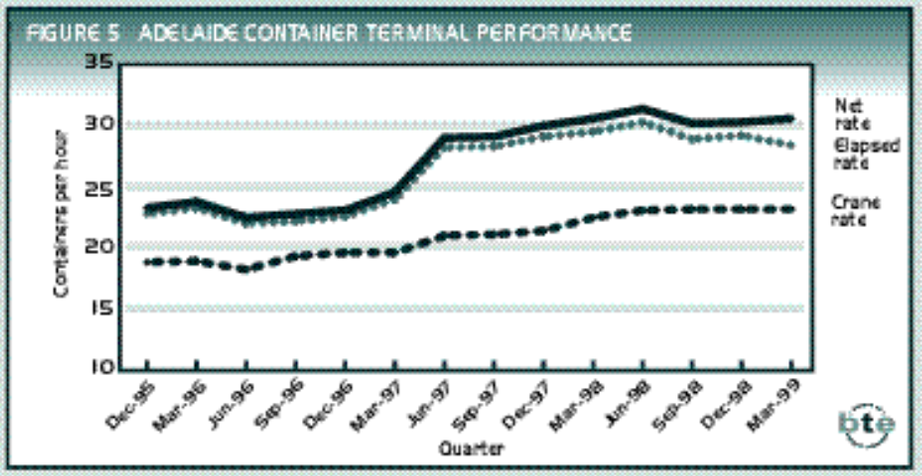
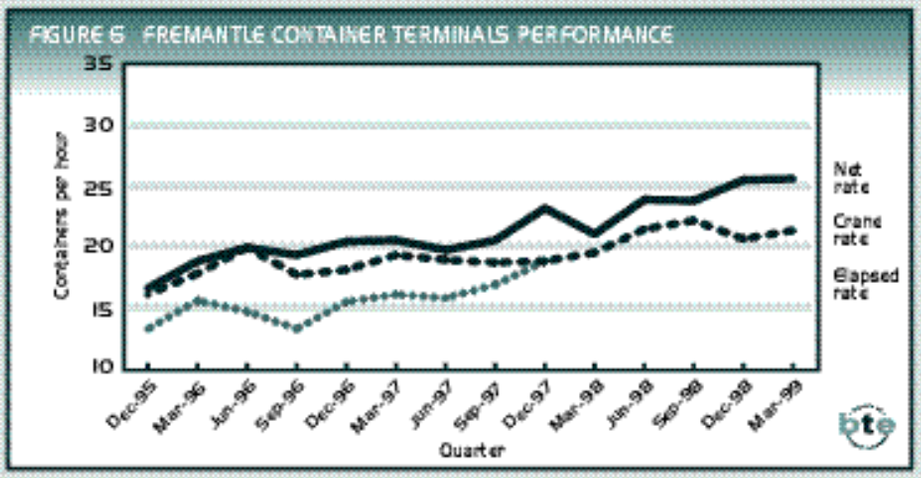


FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE



Note These figures are based on the data contained in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

WATERFRONT RELIABILITY

The Waterline reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. The indicators cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the March quarter 1999. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, MARCH QUARTER 1999

(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5–10	11–20	>20	Total no. of ship calls
Brisbane									
Berth availability	**34**	**0**	**0**	**1**	**0**	0	1	0	36
Pilotage	**36**	**0**	0	0	0	0	0	0	36
Towage	**36**	**0**	0	0	0	0	0	0	36
Sydney									
Berth availability	**63**	**1**	**1**	**0**	**0**	4	2	0	71
Pilotage	**70**	**1**	0	0	0	0	0	0	71
Towage	**71**	**0**	0	0	0	0	0	0	71
Melbourne									
Berth availability	**70**	**0**	**1**	**3**	**2**	4	3	1	84
Pilotage	**83**	**0**	1	0	0	0	0	0	84
Towage	**83**	**0**	1	0	0	0	0	0	84
Adelaide									
Berth availability	**22**	**0**	**0**	**0**	**0**	2	0	0	24
Pilotage	**22**	**2**	0	0	0	0	0	0	24
Towage	**24**	**0**	0	0	0	0	0	0	24
Fremantle									
Berth availability	**49**	**3**	**0**	**0**	**0**	0	1	0	53
Pilotage	**53**	**0**	0	0	0	0	0	0	53
Towage	**53**	**0**	0	0	0	0	0	0	53
Five ports									
Berth availability	**238**	**4**	**2**	**4**	**2**	10	7	1	268
Pilotage	**264**	**3**	1	0	0	0	0	0	268
Towage	**267**	**0**	1	0	0	0	0	0	268

Note *Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns.*

Sources *Data for a sample of ship calls provided by shipping lines.*

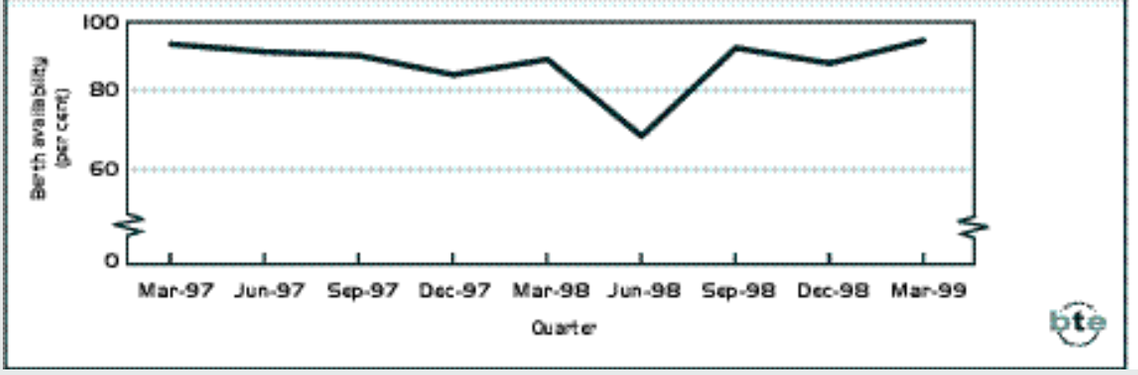
The sample for the March quarter covers 268 ship calls, equivalent to 28 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 20 per cent at Brisbane to 33 per cent at Adelaide. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

The berth availability indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 93 per cent in the March quarter 1999, up from 87 per cent in the December quarter 1998. Figure 7 provides information on berth availability over the period since the March quarter 1997.

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 11 hours in the March quarter 1999. This was down from the figure of 19 hours that was recorded in the previous quarter.

Caution should be used in undertaking inter-port comparisons of the berth availability data in table 2. There is significant variation between ports in factors such as sample sizes and ship call patterns.

FIGURE 7 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997–1999



Sources Data for a sample of ship calls provided by shipping lines.

The pilotage and towage indicators reported in Waterline measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival / departure time. The proportions were close to 100 per cent in the March quarter 1999. Performance has been at similar levels since the first data (covering the March quarter 1997) were published in Waterline.

Other waiting time

The seven shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled / confirmed time. The data on other ship waiting time reported in Waterline exclude ship schedule adjustments.

In the March quarter 1999, forty-seven per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. This was similar to the proportion of 45 per cent that was recorded in the December quarter 1998. The average duration of other waiting time incidents was 7.3 hours per incident in the March quarter 1999, compared with 7.8 hours per incident in the previous quarter.

In the March quarter 1999, around one quarter of the ship calls that incurred other waiting time were affected by two or more incidents. The average number of incidents per affected ship call (1.3) was similar to the average figures in earlier quarters (ranging from 1.3 to 1.4).

Table 3 summarises the data on other waiting time incidents in the March quarter 1999. The shipping lines identified a total of 169 incidents (affecting 127 ship calls) for the sample of ship calls over this period. These incidents reflected both ship-related and waterfront factors.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The data provided by shipping lines indicate that four incident types accounted for around 81 per cent of the total hours attributed to other ship waiting time in the March quarter 1999:

- Early ship arrival (44 per cent);
- Awaiting labour (18 per cent);

- Ship repairs or maintenance (11 per cent);
- Crane breakdown (8 per cent).

The proportion of other ship waiting time attributed to early ship arrival was well above the proportions for this incident type in earlier quarters (ranging from 4 per cent to 23 per cent). The relatively high proportion of early ship arrivals in the March quarter 1999 reflects an increase in the frequency of these incidents and several incidents of long duration.

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, MARCH QUARTER 1999

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5–10	11–20	>20	Total no. of incidents
Early ship arrival	9	4	9	4	14	6	4	50
Awaiting labour	4	14	2	6	14	1	0	41
Crane breakdown	5	9	4	3	4	0	0	25
Stevedoring finished early	3	7	6	2	2	0	0	20
Pilot/tug booking not at preferred time	3	2	2	0	0	0	0	7
Ship repairs or maintenance	0	1	3	0	2	0	1	7
Weather or tides	0	0	1	2	1	0	0	4
Industrial action	0	0	0	1	1	0	0	2
Stevedoring finished late	0	0	0	0	1	0	0	1
Late ship arrival	0	0	0	0	1	0	0	1
Other	3	6	0	0	0	0	2	11
Total incidents	**27**	**43**	**27**	**18**	**40**	**7**	**7**	**169**[a]

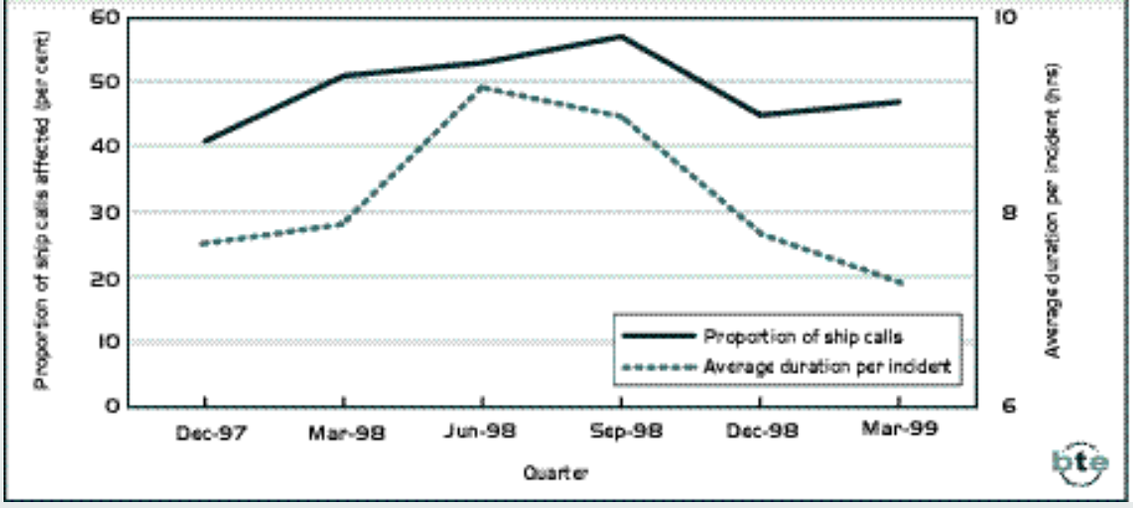
a. These incidents affected 127 of the 268 ship calls covered in table 2.

Sources Data for a sample of ship calls provided by shipping lines.

The March quarter 1999 proportions for several other incident types were well below their peak levels that were recorded during 1998. The major changes included time awaiting labour (peak of 35 per cent), late completion of stevedoring (peak of 24 per cent) and industrial action (peak of 20 per cent). The total waiting time attributed to these three incident types represented 20 per cent of other ship waiting time in the March quarter 1999.

Figure 8 provides information on other ship waiting time over the period since the December quarter 1997. It indicates that the proportion of ship calls affected and the average duration per incident have recently been below the

FIGURE 8 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, DECEMBER QUARTER 1997 TO MARCH QUARTER 1999



Sources Data for a sample of ship calls provided by shipping lines.

peak levels that were recorded for these indicators in the June and September quarters 1998.

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals—stevedoring rate and cargo receival. Data are not available for Adelaide or Fremantle.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. In the March quarter 1999, the stevedoring rate indicator ranged from 50 per cent to 62 per cent at the three ports for which data are available. Factors that potentially affect this indicator include the mix of ships handled at each port, typical cargo stowage patterns on the ships, and operating practices at the terminals.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container terminal performance. In the March quarter 1999, the cargo receival indicator ranged between 82 per cent and 97 per cent at the three ports for which data are available. There was little or no change in the figures for individual ports compared with the previous quarter.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, DECEMBER QUARTER 1998 AND MARCH QUARTER 1999

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar
Indicator	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Stevedoring										
Stevedoring rate	57	62	60	56	52	50	na	na	na	na
Cargo receival	90	90	79	82	97	97	na	na	na	na
Ship arrival										
Advice at 24 hrs	57	82	49	55	na	na	63	69	53	64
Advice inside 24 hrs	92	91	94	96	na	na	95	91	90	87

na not available

Sources AAPMA, Patrick and P&O Ports

Ship arrival

Table 4 includes data for two indicators of ship arrival advice.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority / corporation at 24 hours prior to actual arrival. The proportion at the four ports for which data are available ranged between 55 per cent and 82 per cent in the March quarter 1999. The major change from the previous quarter was a significant increase at Brisbane, reversing the decline reported for this port in the previous quarter.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time advised inside the 24 hours prior to actual arrival. The proportion at the four ports ranged between 87 per cent and 96 per cent in the March quarter 1999.

COASTAL SHIPPING PERMITS

Part VI of the Navigation Act 1912 provides for licensed vessels to carry passengers and cargo in the coasting trade. The Act does not restrict the class of vessels which may obtain a coasting trade licence. Any ship, regardless of registry, is able to obtain a licence provided the crew are paid Australian wage rates while it is engaged in the coasting trade, the ship is not in receipt of foreign government subsidies, and it has not received such a subsidy in the previous twelve months.

Ships which obtain a licence must also conform to the requirements of the Navigation Act, including specified provisions relating to safety, manning, and crew qualifications, rehabilitation and compensation. Where suitable licensed vessels are not available, the Act also provides for the issue of single or continuing voyage permits to unlicensed vessels, where this is considered to be in the public interest. The application fee for a passenger Single Voyage Permit (SVP) is $22 and for a cargo SVP is $200. The application fee for a Continuing Voyage Permit (CVP) is $400.

The increasing number of permits for coastal trade over the past eight years indicates that shippers' (cargo owners') requirements are not being met by local ship operators. Overall, the tonnage moved under the combination of both SVPs and CVPs for 1998 increased by 360 per cent compared with 1991, and by 40 per cent compared with 1997.

Single voyage permits

Table 5 updates the information published in Waterline 17. It presents data on the number of SVPs issued, and cargo carried, over the period from the March quarter 1991 to March quarter 1999. The number of SVPs issued in the March quarter 1999 fell by 23 per cent compared with the December quarter 1998, while tonnes of cargo carried fell by 15 per cent.

Total SVPs issued in 1998 increased by about 350 per cent compared with the number issued in 1991, and by 5 per cent compared with the number issued in 1997. Tonnes of cargo carried using SVPs also increased by about 350 per cent compared with 1991, and by 34 per cent compared with 1997.

TABLE 5 CARGO CARRIED UNDER SINGLE VOYAGE PERMITS, 1991–1999

	Jan–Mar		Apr–Jun		Jul–Sep		Oct–Dec		Total	
Year	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes
1991	44	262 431	26	189 565	34	422 161	61	414 191	165	1 288 348
1992	49	243 049	59	241 373	62	238 017	69	147 514	239	869 953
1993	83	211 430	93	298 769	108	202 252	125	292 664	409	1 005 115
1994	119	412 029	118	498 571	110	899 222	112	970 068	459	2 779 890
1995	116	832 308	90	665 499	91	1 077 022	100	653 940	397	3 228 769
1996	107	575 662	123	930 077	142	1 026 438	146	1 110 332	518	3 642 509
1997	135	661 784	149	1 056 709	196[r]	1 234 786[r]	224[r]	1 319 258[r]	704	4 272 537
1998	184	1 266 030	184	1 301 204	186	1 584 240	187	1 580 034	741	5 731 508
1999	144	1 336 882								

r revised

Note From mid-1997, the data have been collected as SVPs issued; prior data were collected as SVPs used. As most SVPs issued are also used, the differences in the data are likely to be insignificant.

Source Maritime Transport Division, Department of Transport and Regional Services.

Over the last three quarters, the number of SVPs issued has declined compared with the respective quarters of the previous year. However, this decline may be a reflection of the substantial increase in CVPs issued since September 1998.

Table 6 shows a breakdown of SVPs by cargo types for the March quarter 1999. Containerised cargo permits continue to be the major component of the total number of permits issued. Over the period 1996–1999 there has been an increase of about 50 per cent in tonnage for each cargo type.

TABLE 6 SINGLE VOYAGE PERMITS ISSUED AND CARGO CARRIED, MARCH QUARTER 1999

Cargo type	Permits	Tonnes
Petroleum products	15	317 300
Crude oil and feedstock	10	444 000
Liquefied gas	5	24 870
Other bulk liquids	5	10 200
Dry bulk	10	399 200
General cargo		
-containerised	94	140 731
-break bulk	5	581
Total	144	1 336 882

Source *Maritime Transport Division, Department of Transport and Regional Services.*

Continuing Voyage Permits

While CVPs have been available for some time, they were rarely requested or issued. However, between September 1998 and May 1999 twenty-four CVPs were issued. Each CVP covers a six-month period which may otherwise have required some six or seven SVPs. Continuing voyage permits can thus provide efficiencies and cost savings for vessels making multiple visits to Australian ports over short periods. Table 7 shows that, since September 1998, approximately 245 002 tonnes of coastal trade have been moved using CVPs.

TABLE 7 CARGO CARRIED UNDER CONTINUING VOYAGE PERMITS

	Jul–Sep		Oct–Dec		Jan–Mar		Apr–Jun[b]		Total	
Year	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes
1998/99	3[a]	35 820[a]	12	140 270	4	53 400	5	15 512	24	245 002

a. Data cover September only.

b. Data cover period to 17 May 1999.

Source *Maritime Transport Division, Department of Transport and Regional Services.*

More information on SVPs and CVPs can be found on the Department's Internet site at http://www.dotrs.gov.au/.

CREW TO BERTH RATIOS

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days worked over a period of time, divided by the number of berth days operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 9 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the BTE is still auditing the data, the March quarter 1999 merchant shipping data in this issue of Waterline should be regarded as preliminary. The overall crew to berth ratio for merchant shipping fell to 2.105 in the March quarter 1999, compared with 2.108 in the December quarter, and 2.133 in the September quarter 1993 when monitoring commenced. The ratio for the March quarter (2.105) is one of the lowest total merchant shipping figures since crew to berth monitoring began; lower ratios were reported in the March (2.104) and June (2.102) quarters 1998.

Table 8 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the March quarter 1999. Ship time is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio fell to 1.034 in the March quarter, compared with 1.035 in the December quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35 hour week. The accrued leave ratio rose to 0.969 in the March quarter, compared with 0.965 in the December quarter

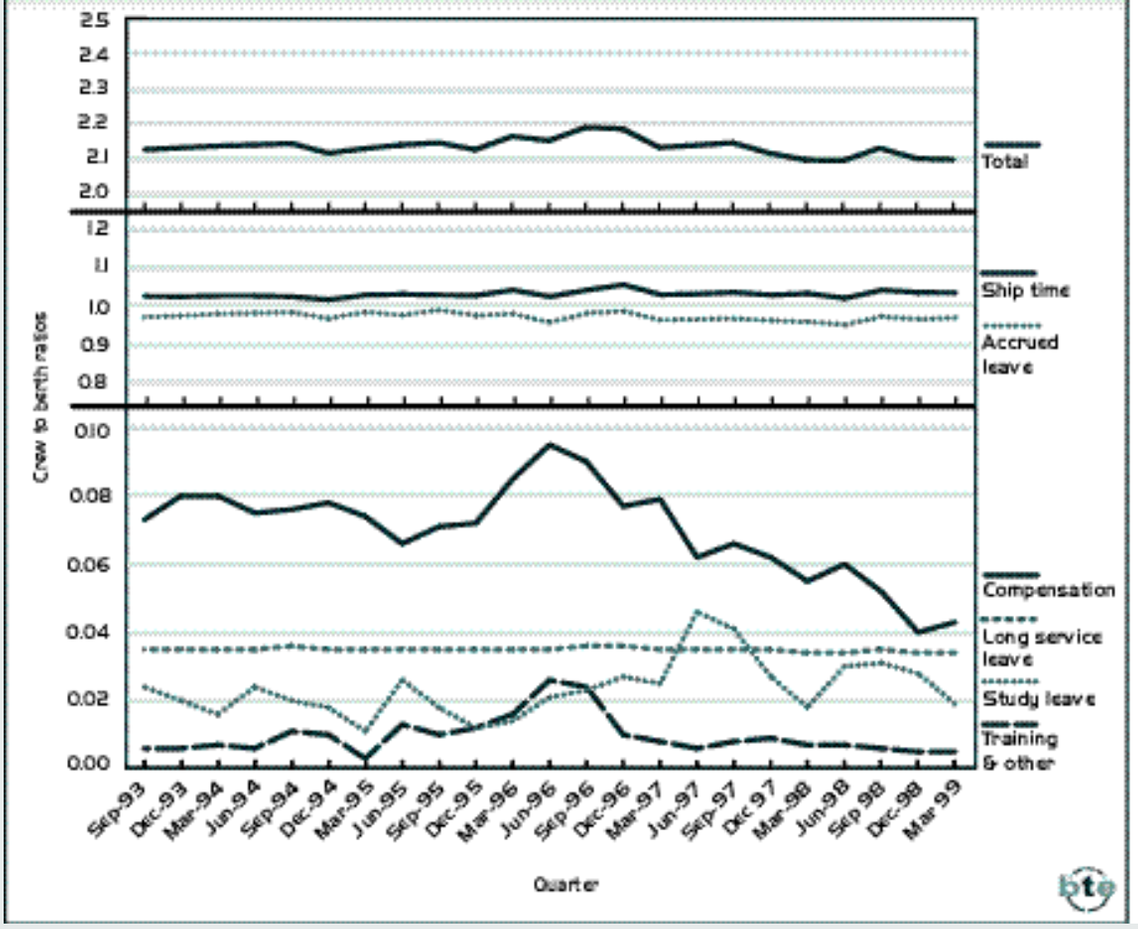
Other components of the merchant shipping crew to berth ratio were:

- compensation leave, which rose to 0.043, compared with 0.040 in the December quarter, representing a fall of about 41 per cent since merchant shipping monitoring began in the September quarter 1993;
- long service leave, which remained constant at 0.034, compared with the December quarter;
- study leave, which fell to 0.019, compared with 0.028 in the December quarter; and
- training and other paid leave, which remained constant at 0.005, compared with the December quarter.

Offshore shipping

Due to an incomplete data set for the March quarter 1999, we have been unable to publish any offshore shipping figures in this edition of Waterline.

FIGURE 9 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING



Sources Data provided by ship operators.

TABLE 8 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, MARCH QUARTER 1999p

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.050	0.984	0.015	0.035	0.036	0.016	2.136
Engineers	1.037	0.972	0.026	0.035	0.044	0.007	2.121
All officers	**1.044**	**0.978**	**0.020**	**0.035**	**0.040**	**0.011**	**2.128**
Integrated ratings	1.024	0.960	0.056	0.034	0.000	0.000	2.075
Catering crew	1.027	0.961	0.089	0.035	0.000	0.000	2.112
All ratings	**1.025**	**0.960**	**0.064**	**0.034**	**0.000**	**0.000**	**2.084**
All crew	**1.034**	**0.969**	**0.043**	**0.034**	**0.019**	**0.005**	**2.105**
Previous quarter	1.035	0.965	0.040	0.034	0.028	0.005	2.108
Initial level[b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a. Components may not sum to totals due to rounding.
b. Monitoring commenced in the September quarter 1993.

Source Data provided by ship operators.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
BTE	Bureau of Transport Economics
CVP	Continuing Voyage Permit
MUA	Maritime Union of Australia
SVP	Single Voyage Permit
teu	Twenty-foot equivalent unit

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.
Elapsed rate—the number of containers or teus moved per elapsed hour.
Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.
Net rate—the number of containers or teus moved per net hour.
Crane rate—the number of containers or teus moved per net crane hour.

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TABLE 9 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—PRODUCTIVITY IN TEUS PER HOUR

	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99
Five ports													
Ships handled	748	827	871	907	865	891	907	963	909	845	1020	942	942
Total teus	411538	440098	497140	519206	441697	483372	549247	585474	527881	514409	633107	612019	573444
Crane rate	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5
Elapsed rate	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na	na
Net rate	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2
Brisbane													
Ships handled	124	133	140	141	156	164	162	177	170	168	192	180	176
Total teus	39037	51008	66115	62904	47471	65572	73184	71043	58857	74023	87373	84200	75444
Crane rate	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6
Elapsed rate	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3
Net rate	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6
Sydney													
Ships handled	206	216	228	249	251	249	243	266	238	219	267	230	221
Total teus	146038	148290	156344	174982	158323	167705	183978	201535	176496	168234	209619	203042	187287
Crane rate	19.5	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4	23.2
Elapsed rate	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6
Net rate	28.0	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3	38.8
Melbourne													
Ships handled	228	262	274	282	230	249	268	281	276	234	309	274	271
Total teus	162911	170884	203371	202376	162156	177070	208200	223465	207346	185803	242456	219549	206727
Crane rate	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5
Elapsed rate	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2
Net rate	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9
Adelaide													
Ships handled	47	63	70	74	69	65	68	66	60	66	63	74	73
Total teus	15955	18803	20519	23351	21963	20933	25982	25188	22260	27975	25493	32556	31326
Crane rate	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0
Elapsed rate	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8
Net rate	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7
Fremantle													
Ships handled	143	153	159	161	159	164	166	173	165	158	189	184	201
Total teus	47597	51113	50791	55593	51784	52092	57903	64243	62922	58374	68166	72672	72660
Crane rate	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6
Elapsed rate	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na
Net rate	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0

na not available

Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

3. For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.

ACKNOWLEDGMENTS

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WaterLine
issue number 20 September 1999

Stevedoring productivity

Table 1 presents the June quarter 1997 to June quarter 1999 indicators of stevedoring productivity at the five major Australian container terminals, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to June quarter 1999 period. The data for Brisbane, Sydney, Melbourne and Fremantle are weighted averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal.

Overall, national stevedoring productivity, as measured by the five-port average, improved further in the June quarter 1999. In fact, the June quarter 1999 five-port average rates reflect the highest level of stevedoring productivity since the BTE commenced monitoring of stevedoring productivity.

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 20.3 containers per hour for the June quarter compared with 19.9 in the March quarter;
- the four-port average *elapsed rate* (productivity *per ship* based on the time labour is aboard the ship) was 24.0 containers per hour for the June quarter compared with 23.1 in the March quarter. (Fremantle elapsed rate data from one operator are not available, and therefore only a four-port average indicator could be calculated. However, given that the five-port average is dominated by Melbourne and Sydney, the four-port figure calculated is a reasonable approximation of the five-port average); and
- the five-port average *net rate* (productivity *per ship* while the ship is worked) was 29.0 containers per hour for the June quarter compared with 28.2 in the March quarter.

The level of stevedoring productivity achieved in the June quarter 1999 comes mainly as a consequence of improvements in productivity at the Patrick terminals, where new enterprise agreements were introduced in September 1998, and partly from the generally sustained levels of performance achieved by P&O Ports and Sea-Land during their negotiations with the MUA. The new enterprise agreements at P&O Ports had a staggered introduction: Brisbane and Fremantle in June, Sydney in July, and at Melbourne in August as an award. The new enterprise agreements at Sea-Land were also recently approved, and backdated to April.

The *Brisbane* average crane rate was 18.9 containers per hour in the June quarter, up from 18.3 in the March quarter. The Brisbane elapsed rate of 21.4 containers per hour and the net rate of 25.9 containers per hour were both up on the March quarter figures. The average proportion of elapsed time not worked increased to approximately 18 per cent.

The *Sydney* average crane rate was 18.2 containers per hour in the June quarter, up from 17.7 in the March quarter. The Sydney elapsed rate of 22.2 containers per hour and the net

Articles in this issue **page**

rate of 28.7 containers per hour were both down on the March quarter figures. The average proportion of elapsed time not worked remained steady at approximately 24 per cent.

The *Melbourne* average crane rate was 21.8 containers per hour in the June quarter, up from 21.5 in the March quarter. The Melbourne elapsed rate of 25.8 containers per hour and the net rate of 31.0 containers per hour were both up on the March quarter figures. The average proportion of elapsed time not worked decreased to approximately 17 per cent.

The Adelaide average crane rate was 23.1 containers per hour in the June quarter, marginally down from 23.2 in the March quarter. The Adelaide elapsed rate of 30.0 containers per hour and the net rate of 31.1 containers per hour were both up on the March quarter. The average proportion of elapsed time not worked returned to approximately 4 per cent from the all time high of 7 per cent last quarter.

The *Fremantle* average crane rate was 21.7 containers per hour in the June quarter, up from 21.4 containers per hour in the March quarter. The P&O Ports elapsed data for the June quarter are not available and therefore the elapsed data for Fremantle have not been produced for this quarter. The net rate of 26.6 containers per hour was up on the March quarter figure.

Container port activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The June quarter 1999 five-port average showed ship visits increased by 1.7 per cent, and container throughput increased by 4.8 per cent when compared with the March quarter. Only at Fremantle did the container throughput fall below the March quarter 1999 figure (in part due to the cessation of the MSC Far East and South East Asia service). Compared with the June quarter of the previous year, the five-port average for container ship visits increased by 13.4 per cent, and the five-port average for container throughput increased by 15.4 per cent.

On a port-by-port basis, the June quarter 1999 *container exchange* at:

- Brisbane was up 16.0 per cent on the March quarter figure, and up 20.5 per cent when compared with the June quarter 1998;
- Sydney was up 7.9 per cent on the March quarter figure, and up 18.0 per cent when compared with the June quarter 1998;
- Melbourne was up 3.7 per cent on the March quarter figure, and up 14.2 per cent when compared with the June quarter 1998;
- Adelaide was up 0.9 per cent on the March quarter figure, and up 4.9 per cent when compared with the June quarter 1998; and
- Fremantle was down 10.1 per cent on the March quarter figure, but up 11.1 per cent when compared with the June quarter 1998.

Teus per hour

Table 12 presents the stevedoring productivity indicators in terms of *teus per hour*. These data are retained in *Waterline* for the purpose of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20 foot and 40 foot containers from one period to the next.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS— PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	**Jun-97**	**Sep-97**	**Dec-97**	**Mar-98**	**Jun-98**	**Sep-98**	**Dec-98**	**Mar-99**	**Jun-99**
Five ports									
Ships handled	891	907	963	909	845	1020	942	942	958
Total containers	387277	431853	467122	421769	406938	493502	477744	448224	469742
Crane rate	18.3	18.3	18.5	18.8	18.7	19.1	18.9	19.9	20.3
Elapsed rate	19.0	20.4	20.5	20.0[a]	20.7[a]	20.7[a]	21.9[a]	23.1[a]	24.0[a]
Net rate	23.6	24.3	24.3	23.4	24.7	24.2	26.9	28.2	29.0
Elapsed time not worked (per cent)	19	16	16	15[a]	16[a]	15[a]	19[a]	19[a]	18[a]
Brisbane									
Ships handled	164	162	177	170	168	192	180	176	193
Total containers	52610	58424	58014	49197	58939	70200	67691	61204	71008
Crane rate	16.4	16.1	16.8	18.0	17.3	18.2	16.8	18.3	18.9
Elapsed rate	16.6	16.8	16.8	16.4	17.1	18.7	19.6	21.2	21.4
Net rate	18.7	19.1	19.6	19.1	20.2	21.9	22.9	24.7	25.9
Elapsed time not worked (per cent)	12	12	15	14	15	15	14	14	18
Sydney									
Ships handled	249	243	266	238	219	267	230	221	243
Total containers	131004	142659	157430	137600	130513	160007	155063	142767	154062
Crane rate	17.7	18.2	18.4	17.5	16.9	16.5	15.7	17.7	18.2
Elapsed rate	18.5	21.7	21.9	19.9	20.2	19.2	18.9	22.6	22.2
Net rate	25.5	27.9	27.7	25.7	26.2	24.2	24.6	29.5	28.7
Elapsed time not worked (per cent)	28	22	21	23	23	21	23	24	24
Melbourne									
Ships handled	249	268	281	276	234	309	274	271	282
Total containers	143708	162591	178302	166284	147122	187696	170056	161894	167942
Crane rate	19.0	18.6	18.8	19.5	19.2	20.2	21.5	21.5	21.8
Elapsed rate	20.3	20.5	19.9	20.1	21.0	21.8	24.3	23.6	25.8
Net rate	24.0	23.5	22.6	22.7	24.2	24.5	30.7	28.8	31.0
Elapsed time not worked (per cent)	15	13	12	12	13	11	21	18	17
Adelaide									
Ships handled	65	68	66	60	66	63	74	73	66
Total containers	16874	20974	20773	18163	23293	21444	26319	24221	24445
Crane rate	21.0	21.1	21.4	22.5	23.1	23.2	23.2	23.2	23.1
Elapsed rate	28.3	28.4	29.2	29.6	30.4	29.0	29.3	28.5	30.0
Net rate	29.1	29.2	30.1	30.7	31.5	30.3	30.4	30.7	31.1
Elapsed time not worked (per cent)	3	3	3	4	3	4	4	7	4
Fremantle									
Ships handled	164	166	173	165	158	189	184	201	174
Total containers	43081	47205	52603	50525	47071	54155	58615	58138	52285
Crane rate	19.0	18.8	18.9	19.6	21.5	22.2	20.7	21.4	21.7
Elapsed rate	15.9	17.0	18.9	na	na	na	na	na	na
Net rate	19.8	20.6	23.2	21.1	23.9	23.8	25.5	25.6	26.6
Elapsed time not worked (per cent)	19	18	18	na	na	na	na	na	na

na not available

a. Four-port average only as Fremantle elapsed rate data are not available .

Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.

2. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 12.

3. Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.

Sources Patrick, P&O Ports and Sea-Land.

CONTAINER TERMINALS' PRODUCTIVITY

FIGURE 1 FIVE MAJOR PORTS

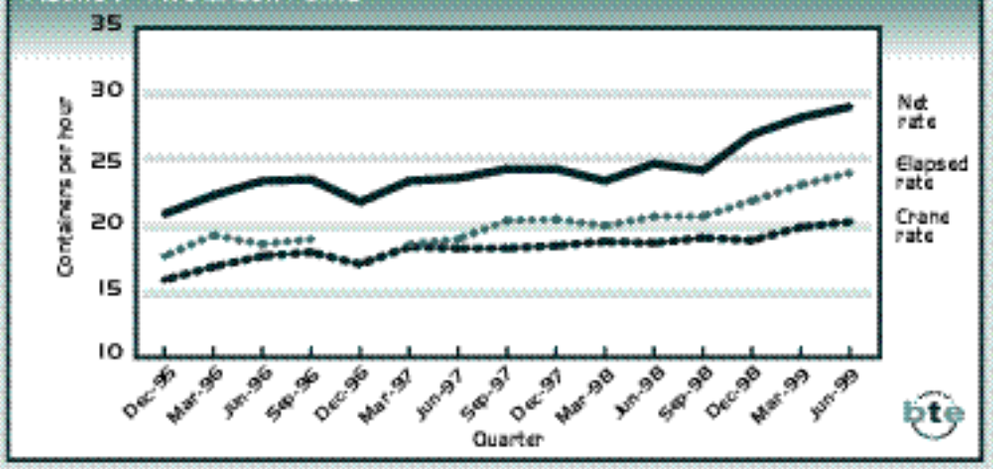


FIGURE 2 BRISBANE

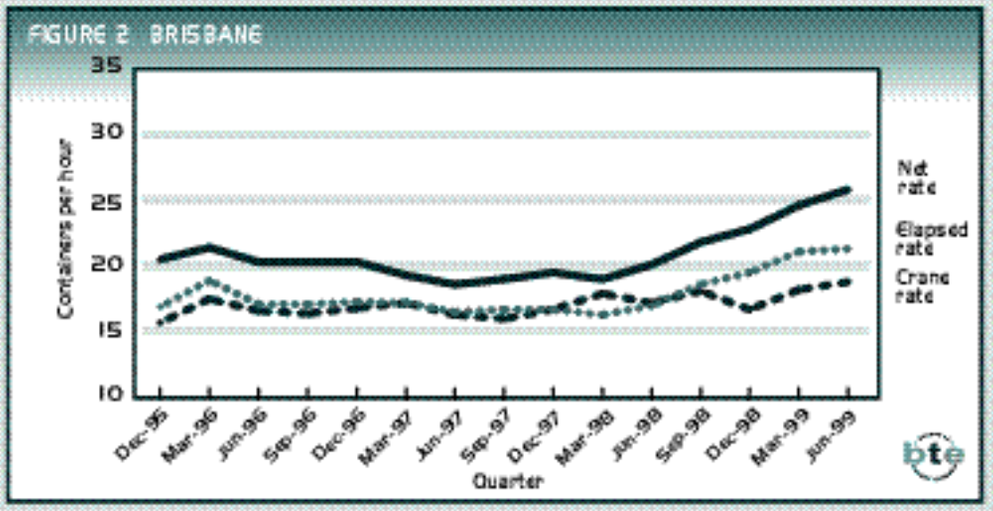
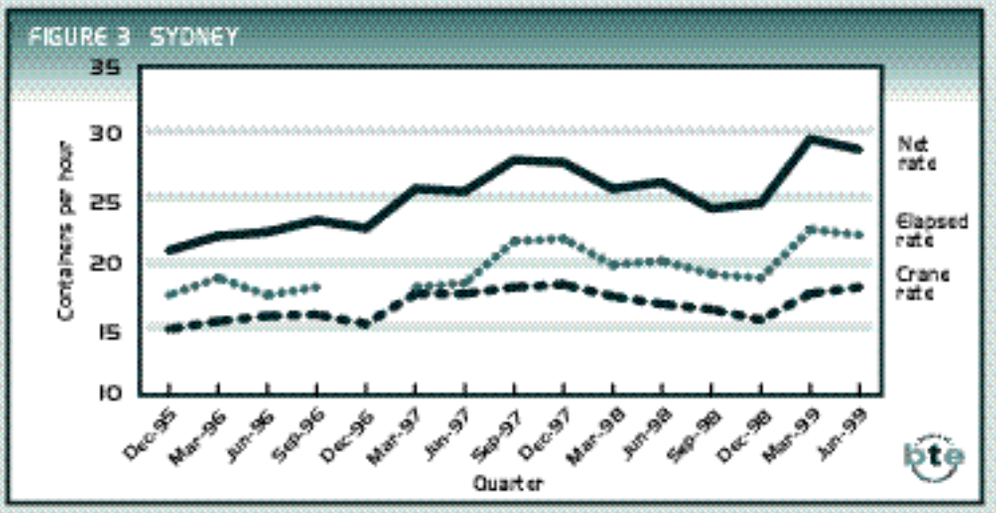


FIGURE 3 SYDNEY



Note These figures are based on the data in table 1. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

CONTAINER TERMINALS' PRODUCTIVITY

FIGURE 4 MELBOURNE

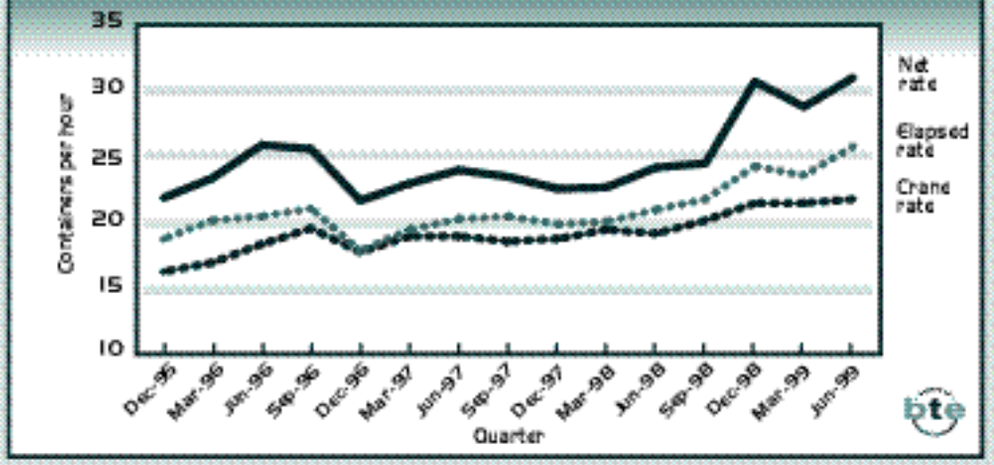


FIGURE 5 ADELAIDE

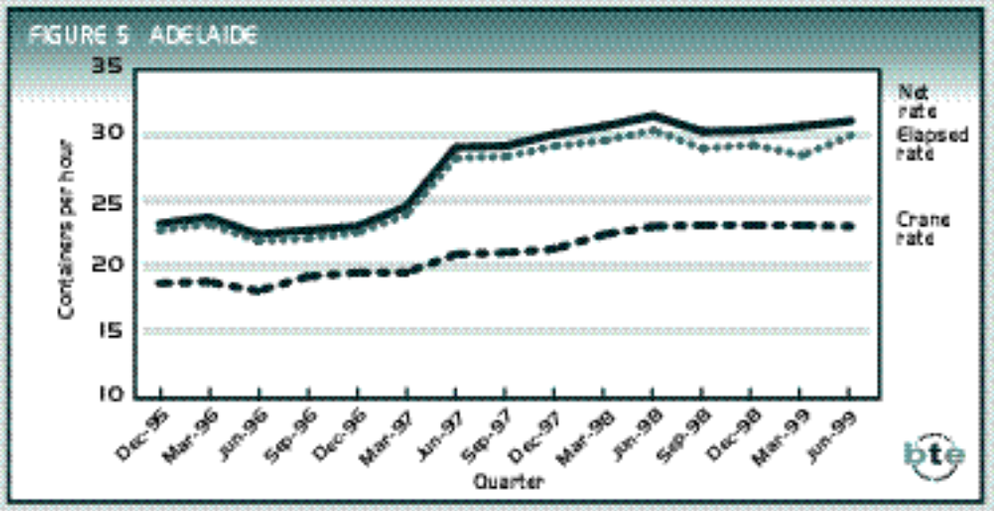
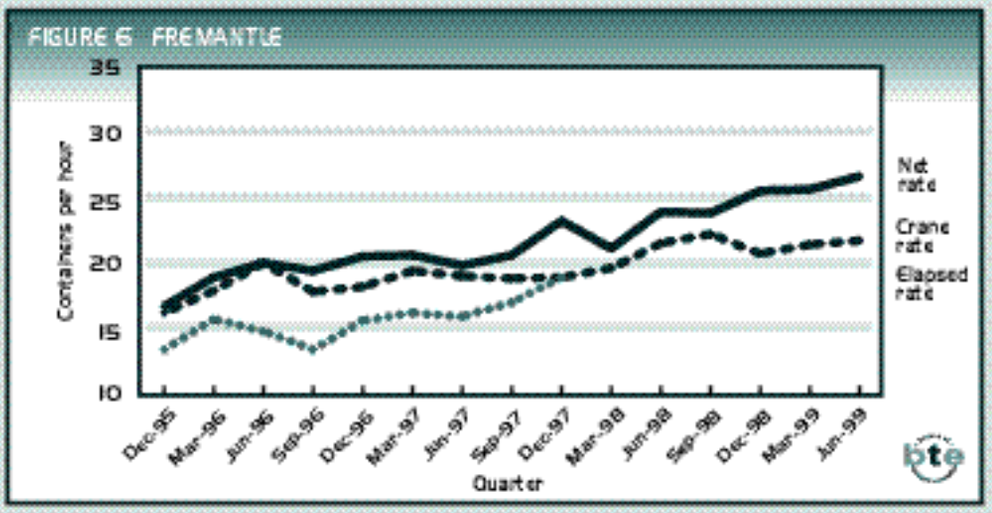


FIGURE 6 FREMANTLE



Note These figures are based on the data in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. The indicators cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

Berth availability, pilotage, towage

Table 2 presents provisional figures on berth availability, pilotage and towage for a sample of ship calls in the June quarter 1999. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

The figures are provisional as several shipping lines that participate in the BTE survey were able to provide data for only part of the June quarter 1999. The number of ship calls covered by the figures is around 30 per cent less than the usual sample size. The June quarter 1999 sample represents 19 per cent of total ship calls at the major container terminals during the period, compared with a proportion of 27–28 per cent in previous quarters.

Caution should therefore be used in interpreting the June quarter 1999 figures, particularly as sample sizes for several ports are very small. The BTE expects that it will be able to include revised June quarter 1999 indicators, based on a larger sample size, in the next issue of *Waterline*.

TABLE 2 PROVISIONAL DATA ON AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, JUNE QUARTER 1999

(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5-10	11-20	>20	Total no. of ship calls
Brisbane									
Berth availability	**13**	**0**	**0**	**0**	**0**	2	1	0	16
Pilotage	**16**	**0**	0	0	0	0	0	0	16
Towage	**16**	**0**	0	0	0	0	0	0	16
Sydney									
Berth availability	**30**	**0**	**1**	**0**	**0**	2	2	1	36
Pilotage	**36**	**0**	0	0	0	0	0	0	36
Towage	**36**	**0**	0	0	0	0	0	0	36
Melbourne									
Berth availability	**64**	**0**	**0**	**0**	**0**	2	1	1	68
Pilotage	**67**	**1**	0	0	0	0	0	0	68
Towage	**68**	**0**	0	0	0	0	0	0	68
Adelaide									
Berth availability	**20**	**0**	**1**	**0**	**0**	2	0	0	23
Pilotage	**22**	**1**	0	0	0	0	0	0	23
Towage	**23**	**0**	0	0	0	0	0	0	23
Fremantle									
Berth availability	**39**	**0**	**0**	**0**	**1**	1	0	0	41
Pilotage	**41**	**0**	0	0	0	0	0	0	41
Towage	**41**	**0**	0	0	0	0	0	0	41
Five ports									
Berth availability	**166**	**0**	**2**	**0**	**1**	9	4	2	184
Pilotage	**182**	**2**	0	0	0	0	0	0	184
Towage	**184**	**0**	0	0	0	0	0	0	184

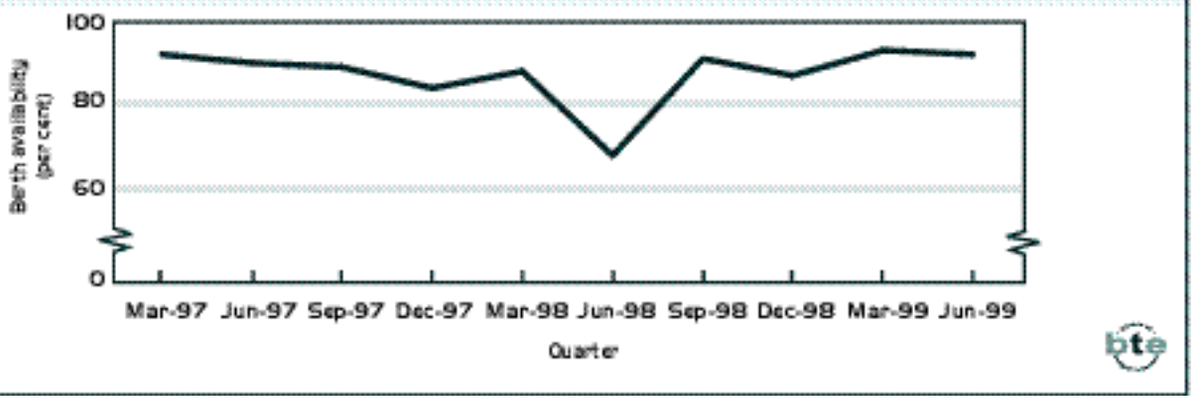
Note *Figures are provisional due to unavailability of some data at time of publication. Figures for individual ports should be interpreted with caution as sample sizes for several ports are very small.*

Sources *Data for a sample of ship calls provided by shipping lines.*

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 92 per cent (provisional figure) in the June quarter 1999. This was similar to the figure of 93 per cent reported in the March quarter 1999. Figure 7 provides information on berth availability over the period since the March quarter 1997.

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 13 hours (provisional figure) in the June quarter 1999. This was up from the figure of 11 hours that was recorded in the previous quarter.

FIGURE 7 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997–1999



Sources Data for a sample of ship calls provided by shipping lines.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportions were 100 per cent in the June quarter 1999. Performance has been at similar levels since the first data (covering the March quarter 1997) were published in *Waterline*.

Other waiting time

The seven shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

In the June quarter 1999, 52 per cent (provisional figure) of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. The corresponding proportion in the March quarter 1999 was 47 per cent. The average duration of other waiting time incidents was 5.7 hours per incident (provisional figure) in the June quarter 1999, compared with 7.3 hours per incident in the previous quarter.

Table 3 summarises the data on other waiting time incidents in the June quarter 1999. The shipping lines identified a total of 144 incidents (affecting 95 ship

TABLE 3 PROVISIONAL DATA ON OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, JUNE QUARTER 1999

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5-10	11-20	>20	Total no. of incidents
Early ship arrival	10	10	6	7	9	2	0	44
Awaiting labour	3	6	5	5	5	1	0	25
Crane breakdown	7	4	5	2	4	0	0	22
Stevedoring finished early	4	8	1	2	3	0	0	18
Ship repairs or maintenance	3	0	1	1	2	1	0	8
Weather or tides	0	2	1	0	1	1	0	5
Pilot/tug booking not at preferred time	1	2	1	0	0	0	0	4
Stevedoring finished late	0	2	0	0	0	0	0	2
Late ship arrival	0	0	0	0	1	1	0	2
Industrial action	0	0	0	0	1	0	0	1
Other	2	5	1	2	1	2	0	13
Total incidents	**30**	**39**	**21**	**19**	**27**	**8**	**0**	**144[a]**

a. These incidents affected 95 of the 184 ship calls covered in table 2.

Note Figures are provisional due to unavailability of some data at time of publication.

Sources Data for a sample of ship calls provided by shipping lines.

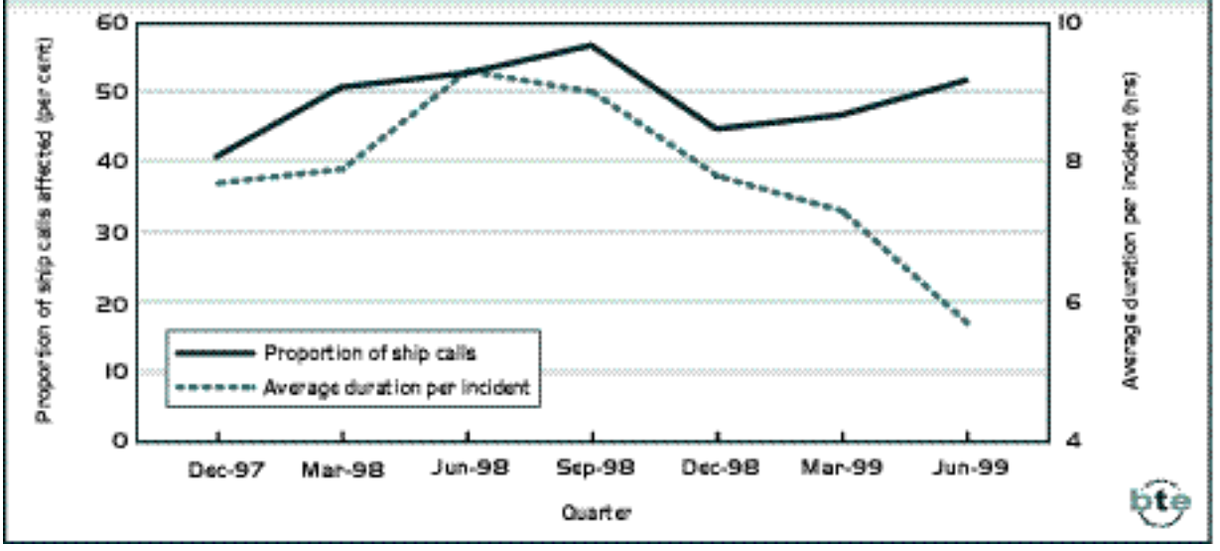
calls) for the sample of ship calls over this period (provisional figures). These incidents reflected both ship-related and waterfront factors.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The data provided by shipping lines indicate that four incident types accounted for around 71 per cent (provisional figure) of the total hours attributed to other ship waiting time in the June quarter 1999:

- early ship arrival (31 per cent);
- awaiting labour (19 per cent);
- crane breakdowns (12 per cent); and
- completion of stevedoring earlier than forecast (9 per cent).

Figure 8 provides information on other ship waiting time over the period since the December quarter 1997. It indicates the proportion of ship calls affected and the average duration per incident in each quarter.

FIGURE 8 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, 1997-1999



Sources Data for a sample of ship calls provided by shipping lines.

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals - stevedoring rate and cargo receival. Data are not available for Adelaide and Fremantle.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. In the June quarter 1999, the stevedoring rate indicator declined significantly at each of the ports for which data are available.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container

terminal performance. In the June quarter 1999, the cargo receival indicator declined significantly at two of the three ports for which data are available.

The declines in stevedoring rate and cargo receival are reportedly attributable to temporary factors at several terminals.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation *at 24 hours prior to actual arrival*. Compared with the previous quarter, there were significant declines in this indicator at two ports and increases at the other two ports.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. The proportion at the four ports ranged between 75 per cent and 96 per cent in the June quarter 1999. The major change from the previous quarter was a significant decline at Fremantle.

The accuracy of ship arrival advice is potentially affected by various factors such as weather conditions.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, MARCH AND JUNE QUARTERS 1999

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	**Jan–Mar**	**Apr–Jun**	**Jan–Mar**	**Apr–Jun**	**Jan–Mar**	**Apr–Jun**	**Jan–Mar**	**Apr–Jun**	**Jan–Mar**	**Apr–Jun**
Stevedoring										
Stevedoring rate	60[r]	51	51[r]	42	48[r]	41	na	na	na	na
Cargo receival	90	84	82	73	97	97	na	na	na	na
Ship arrival										
Advice at 24 hrs	82	70	55	59	na	na	69	76	64	50
Advice inside 24 hrs	91	95	96	96	na	na	91	92	87	75

na not available
r revised to incorporate amended data provided by a terminal operator
Sources AAPMA, Patrick and P&O Ports.

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs (charges) for containers moved through the Australian mainland capital city ports. Data for the periods July–December 1998 and January–June 1999 are presented in tables 5 to 7. 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. The indicative approach was adopted because of the difficulty of obtaining data on the multitude of factors affecting the prices charged by each service provider, particularly for towage and road transport charges, and customs brokers' fees.

Port and related charges

Table 5 provides the parameters used to determine the port and related charges in table 6. These parameters relate to a representative port call by a containership (Lloyd's ship classification UCC). The representative ship was selected from the range of ship-size with the most port calls by UCC-type ships during the six months. The ship size range of 15 000 to 20 000 GRT has had the most port calls at each port since monitoring of port charges commenced in 1992. The other cost parameters are then determined by taking the mean of all port calls in the range that contains the representative ship.

TABLE 5 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1998/1999

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
Teus exchanged[a]										
Total	447	399	858	772	868	888	560	560	363	394
Loaded	346	310	679	621	719	736	427	433	282	312
Empty	101	89	179	151	149	152	133	127	81	82
Loaded inwards	164	132	432	393	389	466	187	176	149	156
Loaded outwards	182	178	247	228	330	270	240	257	133	156
Ship call parameters[a]										
Number of port calls	4	4	3	3	4	4	6	10	7	10
Elapsed berth time (hrs)	26	24	42	40	35	38	20	20	20	21

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

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

It is important to directly connect the mean number of teus exchanged per port call with the size of the representative ship. This is because most port and related charges, particularly towage and port authority tonnage charges, are dependent upon the size of the ship. However, shipping economics are such that, the larger the ship being used to transport the cargo, the more ship operators attempt to exchange higher volumes of cargo per port call. As a result, the per unit (in this case teu) cost of exchanging cargo at a particular port remains roughly the same for each port call regardless of the size of the ship. It is for this reason that comparative port charge analyses that keep the cargo exchange constant while varying the ship size are misleading. A discussion of this, in relation to the Port Interface Cost Index, can be found in *Waterline 4*, October 1995, pp. 9–13. That article also demonstrates that the BTE's

Port Interface Cost Index is a reasonable approximation of port interface costs for most container movements across the Australian mainland capital city ports.

Table 6 provides the port and related charges at the five mainland capital city ports for the periods July–December 1998 and January–June 1999. Port and related charges comprise ship-based charges and cargo-based charges.

TABLE 6 PORT AND RELATED CHARGES, 1998

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999
Ship-based charges ($/teu)										
Conservancy	5.01	5.70	-	-	-	-	1.53	1.53	1.46	1.01
Tonnage	-	-	7.82	8.69	6.03	5.90	7.27	7.26	6.97	6.42
Pilotage	11.48	12.86	3.96	4.07	6.32	6.18	4.20	4.20	5.75	5.30
Towage	16.99	19.03	11.39	9.49	7.05	7.75	21.96	21.98	13.55	12.48
Mooring, unmooring	3.83	4.29	3.67	4.08	1.08	1.06	-	-	3.03	2.79
Berth hire[a]	-	-	-	-	9.66	10.18	-	-	-	-
Total[b]	37.31	41.87	26.84	26.33	30.14	31.07	34.96	34.97	30.76	27.99
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	33.00	33.00	53.00	53.00	47.30	47.30
Exports	26.00	26.00	45.00	45.00	33.00	33.00	53.00	53.00	47.30	47.30
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	13.90	13.90
Total port and related charges ($/teu)[b]										
Loaded imports	105	110	87	86	63	64	88	88	92	89
Loaded exports	105	110	72	71	63	64	88	88	92	89
Charges per ship visit ($/visit)										
Total ship-based charges	16667	16702	23036	20334	26173	27576	19581	19574	11171	11039
Empty teus[c]	1439	1268	1790	0	596	608	0	0	624	631

- *not applicable*

a. *Charged by stevedores and itemised separately from basic stevedoring charge.*

b. *Components may not sum to totals due to rounding.*

c. *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 5.*

Sources *BTE 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.*

Ship-based charges

Compared with the July–December 1998 period, the only changes to actual ship-based charges, on a ship-visit basis, in January–June 1999 were:

- a 1.5 per cent increase in conservancy dues at Brisbane;
- a 7.5 per cent decrease in pilotage charges at Sydney; and
- a 12.4 per cent increase in towage charges at Melbourne.

However, taking into account changes in the parameters upon which the ship-based charges are calculated, the overall changes in ship-based charges, on a teu basis, in January–June 1999 were:

- at *Brisbane*, a 12 per cent rise in ship-based charges per teu—resulting from a slight increase in conservancy charges and an 11 per cent drop in the average teu-exchange;

- at *Sydney*, a 2 per cent fall in ship-based charges per teu—resulting from the impact of both a 7.5 per cent decrease in pilotage charges and a decrease in the tugs required per ship visit being reduced by a 10 per cent decease in the teu-exchange;
- at *Melbourne*, a 3 per cent rise in ship-based charges per teu—resulting from the 12.4 per cent increase in towage charges which counteracted the 2 per cent increase in average teu-exchange. Although the increase of 12.4 per cent is greater than the 10 per cent approved by the ACCC in February this year, it should be noted that the increase approved by the ACCC was a weighted average for *all* port calls, not just for the vessels in our indicative range;
- at *Adelaide*, a negligible change in ship-based charges per teu—resulting from a minor change in both the average teu-exchange and the elapsed berth time; and
- at *Fremantle*, a 9 per cent fall in ship-based charges per teu—resulting from both a 9 per cent increase in average teu-exchange and a substantial increase in the average number of port calls per ship.

While caution should always be used when making port comparisons on a per teu basis, Sydney remains the lowest-cost port for ship-based charges. This is significant from a cargo owner's point of view. From the point of view of ship operators, using ships similar to the representative ship in table 5, Fremantle remains the lowest cost port for ship-based charges on a per ship-visit basis.

Cargo-based charges

Except at Sydney, where wharfage for an empty teu fell from $10 per unit to zero, there were no other changes in port and related cargo-based charges in January–June 1999. However, it should be noted that charges such as those on empty containers are not included in the Port Interface Cost Index. This is because such charges are borne by the ship operator rather than the cargo owner. Nevertheless, the empty container charges are reported in table 6 as a charge per ship visit for the sake of completeness.

Changes in total port and related charges per loaded teu

Total port and related charges per loaded teu, for the period January–June 1999:

- at *Brisbane*, rose by about 4 per cent, solely due to the 12 per cent increase in the ship-based component;
- at *Sydney*, fell by almost 1 per cent, solely due to the 2 per cent decrease in the ship-based component;
- at *Melbourne*, rose by about 1 per cent, solely due to the 3 per cent increase in the ship-based component;
- at *Adelaide*, remained basically unchanged; and
- at *Fremantle*, fell by about 3 per cent, solely due to the 9 per cent decrease in the ship-based component.

Stevedoring charges per teu

The last ACCC survey of container terminal operations provided a provisional estimate of stevedoring charges of $203 per teu in 1995. For the January–June 1997 period, the BTE contacted a range of shipping lines and terminal operators in an interim attempt to obtain more recent estimates for container stevedoring charges. As a result, it was estimated that average revenue for container stevedoring was approximately 7.5 per cent, or $15, per teu lower than the ACCC's provisional 1995 esti-

mate. This led to a provisional stevedoring charge of $188 being used for the Port Interface Cost Index.

Earlier this year, the Commonwealth Treasurer directed the ACCC to undertake a monitoring program of the prices, costs and profits of the container stevedoring companies at the major Australian container ports. Once the results of this survey become available, the BTE will include the more up-to-date stevedoring charges in the Port Interface Cost Index.

Land-based charges per teu

The average charges for customs brokers' fees and road transport charges for the July–December 1998 and January–June 1999 Port Interface Cost Index are included in table 7. These charges are based on data provided by approximately 40 customs brokers and 50 road transport operators. Customs brokers' fees for imports are higher than fees for exports, reflecting the more complex clearance procedures for import containers.

The January–June 1999 period indicated no movement in aggregate customs brokers' fees apart from a fall, in Fremantle, of 1 per cent in both import fees and export fees. Similarly, there was no movement in average road transport charges other than a 2 per cent rise in Fremantle.

One of the parameters used to estimate road transport charges is the time taken to move containers from (to) the wharf to (from) the customer's warehouse. Both distance and traffic congestion impact upon this parameter and help explain, to some

TABLE 7 PORT INTERFACE COSTS, 1998/1999

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999
Imports										
Ship-based charges	37	42	27	26	30	31	35	35	31	28
Cargo-based charges	68	68	60	60	33	33	53	53	61	61
Stevedoring[p]	188	188	188	188	188	188	188	188	188	188
Customs brokers' fees	123	123	152	152	138	138	132	132	143	141
Road transport charges	185	185	288	289	251	251	168	168	195	199
Total imports[a]	602	607	714	714	640	640	576	576	618	617
Exports										
Ship-based charges	37	42	27	26	30	31	35	35	31	28
Cargo-based charges	68	68	45	45	33	33	53	53	61	61
Stevedoring[p]	188	188	188	188	188	188	188	188	188	188
Customs brokers' fees	77	77	111	111	89	89	73	73	70	69
Road transport charges	185	185	288	289	251	251	168	168	195	199
Total exports[a]	555	560	658	658	591	591	518	518	545	545

p provisional pending updating of stevedoring charge using detailed survey data

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

Notes 1. Based on parameters described in table 5.

2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.

3. The stevedoring charge used in Waterline is a weighted average for several major Australian ports. Stevedoring charges vary between ports, but detailed data for individual ports are not publicly available.

Sources BTE 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; and stevedoring charges data supplied by the ACCC and industry sources.

extent, the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

In fact, in *Waterline 18*, the BTE reported that it had received numerous comments from road transport operators in Sydney about increasing congestion and terminal delays. Although most operators surveyed this time said the situation had improved, there is still anecdotal evidence of occasionally significant delays from traffic congestion, and service delays at stevedoring terminals and empty container parks. Consequently, it is likely that road transport charges in Sydney are more variable than at other ports.

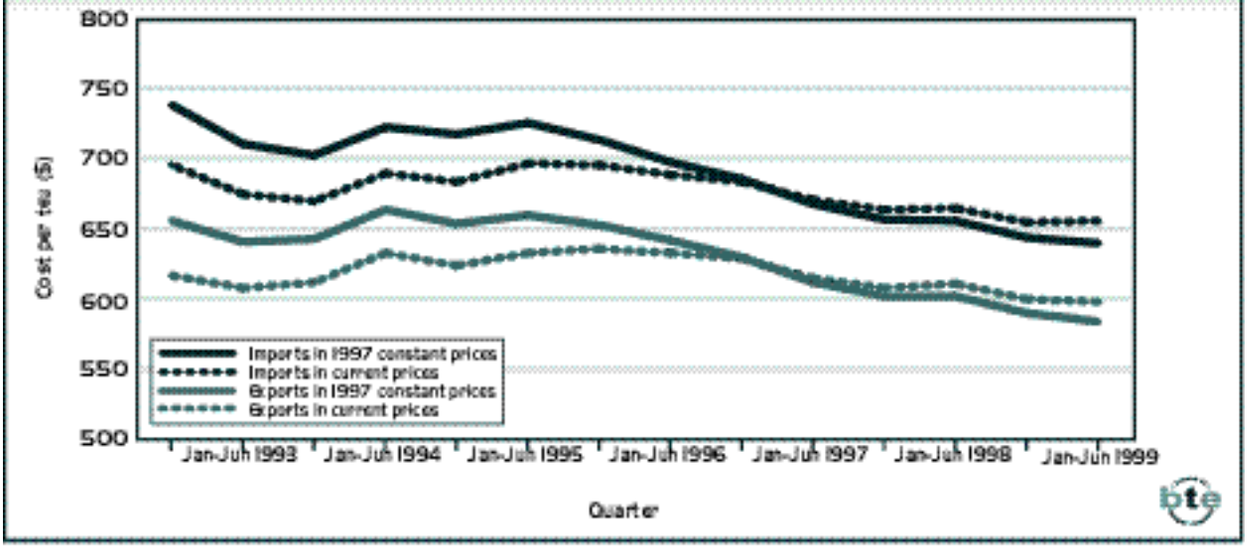
Indices for individual ports

Table 7 indicates that, between July–December 1998 and January–June 1999, there was a 1 per cent increase in port interface costs per teu at Brisbane, while costs remained steady at the other four ports. However, this should be interpreted with caution given the provisional nature of the reported stevedoring charges. Even if stevedoring charges did not change during the January–June 1999 period, care should still be taken in making inter-port comparisons of port interface costs. The use of a single stevedoring charge for all ports reflects the scope of the available information which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

National index

Figure 9 provides the National Port Interface Cost Index back to 1992. In overall terms, there was little movement in the national index between the July–December 1998 and January–June 1999 periods. In fact, in current prices, national import charges increased by only 0.1 per cent to $656 per teu, while export charges decreased by 0.2 per cent to $598 per teu.

FIGURE 9 NATIONAL PORT INTERFACE COST INDEX



Sources BTE 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 gross non-farm product deflator data (cat.no.5206.0).

PORT PERFORMANCE—NON-FINANCIAL

Non-financial indicators for the five mainland capital city ports in 1998/1999 are presented in table 8.

Cargo throughput

Total cargo throughput at the five ports was 47.8 million tonnes for January–June 1999, compared with 46.7 million tonnes for the July–December 1998 period. Total cargo throughput increased at all ports: Brisbane 5.8 per cent, Sydney 0.1 per cent, Melbourne 1.2 per cent, Adelaide 9.9 per cent and Fremantle 0.3 per cent. Overall, this resulted in a rise of 2.2 per cent in total throughput for the five ports compared with the previous half year, and a rise of 5.7 per cent compared with the same half-year period of the previous year.

Non-containerised general cargo throughput at the five ports was 2.37 million tonnes for January–June 1999, compared with 2.42 million tonnes for July–December 1998. This was the outcome of increases at the east coast ports of Brisbane (8.1 per cent) and Sydney (8.4 per cent); and declines at the south and west coast ports of Melbourne (5.8 per cent), Adelaide (1.5 per cent) and Fremantle (13.0 per cent). Overall, this resulted in a fall of 2.2 per cent in non-containerised general cargo throughput for the five ports compared with the previous half year, and a fall of 0.3 per cent compared with the same half-year period in 1998.

Total container traffic throughput for the five ports, measured in teus, was 1.36 million teus for January–June 1999, compared with 1.39 million teus for July–December 1998. This represents a decline of 2.0 per cent. Throughput of loaded teus fell by 0.9 per cent, with loaded imports decreasing by 4.5 per cent and loaded exports increasing by 3.7 per cent. This was the outcome of an increase in loaded containers at Brisbane (8.4 per cent) and Adelaide (5.4 per cent), and a

TABLE 8 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1998/1999

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five ports[e]	
Indicator	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1998	Jan–Jun 1999
Total cargo throughput ('000 tonnes)	10 082	10 663	11 435	11 447	10 649	10 774	2 848	3 129	11 727	11 762	46 741	47 775
Non-containerised general cargo ('000 tonnes)[a]	481	520	310	336	1 100	1 036	132	130	399	347	2 422	2 368
Containerised cargo (teus exchanged)												
Full import	62 980	61 411	226 977	218 094	254 315	241 834	19 744	19 280	58 041	53 309	622 057	593 928
Empty import	24 630	28 334	9 159	13 006	35 220	38 766	8 209	8 552	15 313	14 230	92 531	102 888
Full export	70 168	82 911	129 669	126 359	215 915	220 387	25 365	28 271	51 833	53 159	492 950	511 087
Empty export	14 388	12 881	84 751	70 565	62 293	52 431	5 781	5 384	16 205	13 607	183 418	154 868
TOTAL	172 166	185 537	450 556	428 024	567 743	553 418	59 099	61 487	141 392	134 305	1 390 956	1 362 771
Average total employment[b]	190	211	192	189	73	78	167	162	180	169	802	808
Port turnaround time (hrs)[c]												
Median result	35	33	43	38	36	36	21	18	23	23	-	-
95th percentile[d]	69	65	77	66	66	67	48	26	51	44	-	-

- *not applicable*
a. *Excludes bulk cargoes.*
b. *Comparisons between ports are not appropriate since each port authority/corporation has a different structure.*
c. *Port turnaround times refer only to container ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.*
d. *The 95th percentile time is the point at which there are only five per cent of ship visits experiencing slower turnaround times.*
e. *Components may not sum to totals due to rounding.*

Source *AAPMA.*

decrease at Sydney (3.4 per cent), Melbourne (1.7 per cent), and Fremantle (3.1 per cent).

The annual 1998/99 five-port total container traffic, measured in teus, increased by 9.5 per cent, compared with 1997/98.

Cargo throughput series

The five-port cargo-throughput indicators, covering the past six years, are presented in table 9. Data for the January–June 1999 period show that cargo throughput rose in all categories, compared with the July–December 1993 figures reported in the first issue of *Waterline*. For instance:

- total cargo throughput increased by 30 per cent;
- non-containerised general cargo increased by 6 per cent;
- loaded teus exchanged increased by 44 per cent;
- empty teus exchanged increased by 63 per cent; and
- total teus exchanged overall increased by 47 per cent.

Employment

Table 8 indicates that *average employment* at the five mainland capital city port authorities/corporations rose by 0.7 per cent in the January–June 1999 period compared with the previous half-year. However, it is a decline of 15.5 per cent compared with July–December 1996, the earliest comparable period since BTE monitoring commenced. Prior to this period, major reforms throughout the Australian port authority sector were at various stages at each of the ports.

TABLE 9 FIVE PORTS CARGO THROUGHPUT, 1993–1999

	Mass tonnes		Teus				
	Total port throughput	Non-containerised general cargo	Full imports	Empty imports	Full exports	Empty exports	Total teus
Jul–Dec 1993	36 775 000	2 231 243	407 204	76 016	362 564	82 427	928 211
Jan–Jun 1994	39 223 000	2 100 493	395 714	77 176	367 384	82 377	922 651
Jul–Dec 1994	39 498 000	2 219 448	473 689	69 796	380 991	97 584	1 022 060
Jan–Jun 1995	40 577 614	2 211 036	445 706	68 513	380 681	118 267	1 013 167
Jul–Dec 1995	39 071 079	2 091 371	470 063	74 224	406 129	113 991	1 064 407
Jan–Jun 1996	42 815 205	2 159 032	451 162	89 389	412 627	111 745	1 064 923
Jul–Dec 1996	42 537 779	2 315 883	517 366	89 019	442 176	114 766	1 163 327
Jan–Jun 1997	45 363 506	2 244 980	491 179	82 588	443 838	104 601	1 122 206
Jul–Dec 1997	43 556 788	2 526 925	584 012	93 206	485 118	135 398	1 297 734
Jan–Jun 1998	45 219 540	2 375 889	537 545	79 821	453 656	146 545	1 217 567
Jul–Dec 1998	46 740 803	2 421 898	622 057	92 531	492 950	183 418	1 390 956
Jan–Jun 1999	47 775 467	2 368 304	593 928	102 888	511 087	154 868	1 362 771

Source AAPMA data in Waterline, various issues.

CREW TO BERTH RATIOS

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days worked over a period of time, divided by the number of berth days operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

As the BTE is still auditing the data, both the June quarter 1999 merchant shipping data and offshore shipping data in this issue of *Waterline* should be regarded as preliminary.

Merchant shipping

Figure 10 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. The overall crew to berth ratio for merchant shipping fell to 2.089 in the June quarter 1999, compared with 2.105 in the March quarter, and 2.133 in the September quarter 1993 when monitoring commenced. The ratio for the June quarter (2.089) is the lowest total merchant shipping figure since crew to berth monitoring began.

Table 10 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the June quarter 1999. Ship time is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio fell to 1.026 in the June quarter, compared with 1.034 in the March quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35 hour week. The accrued leave ratio fell to 0.955 in the June quarter, compared with 0.969 in the March quarter.

Other components of the merchant shipping crew to berth ratio were:

- compensation leave, which fell to 0.042, compared with 0.043 in the March quarter, representing a fall of about 42 per cent since merchant shipping monitoring began in the September quarter 1993;
- long service leave, which remained constant at 0.034, compared with the December quarter;
- study leave, which rose to 0.027, compared with 0.019 in the March quarter; and
- training and other paid leave, which fell to 0.004, compared with 0.005 in the March quarter.

Offshore shipping

Figure 11 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. The overall crew to berth ratio for offshore shipping rose to 2.359 in the June quarter 1999, compared with 2.323 in the March quarter, and 2.327 in the initial March quarter 1995.

Table 11 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the June quarter 1999. Accrued leave is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two crew duty system, annual leave and time spent travelling in off-duty time.

FIGURE 10 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

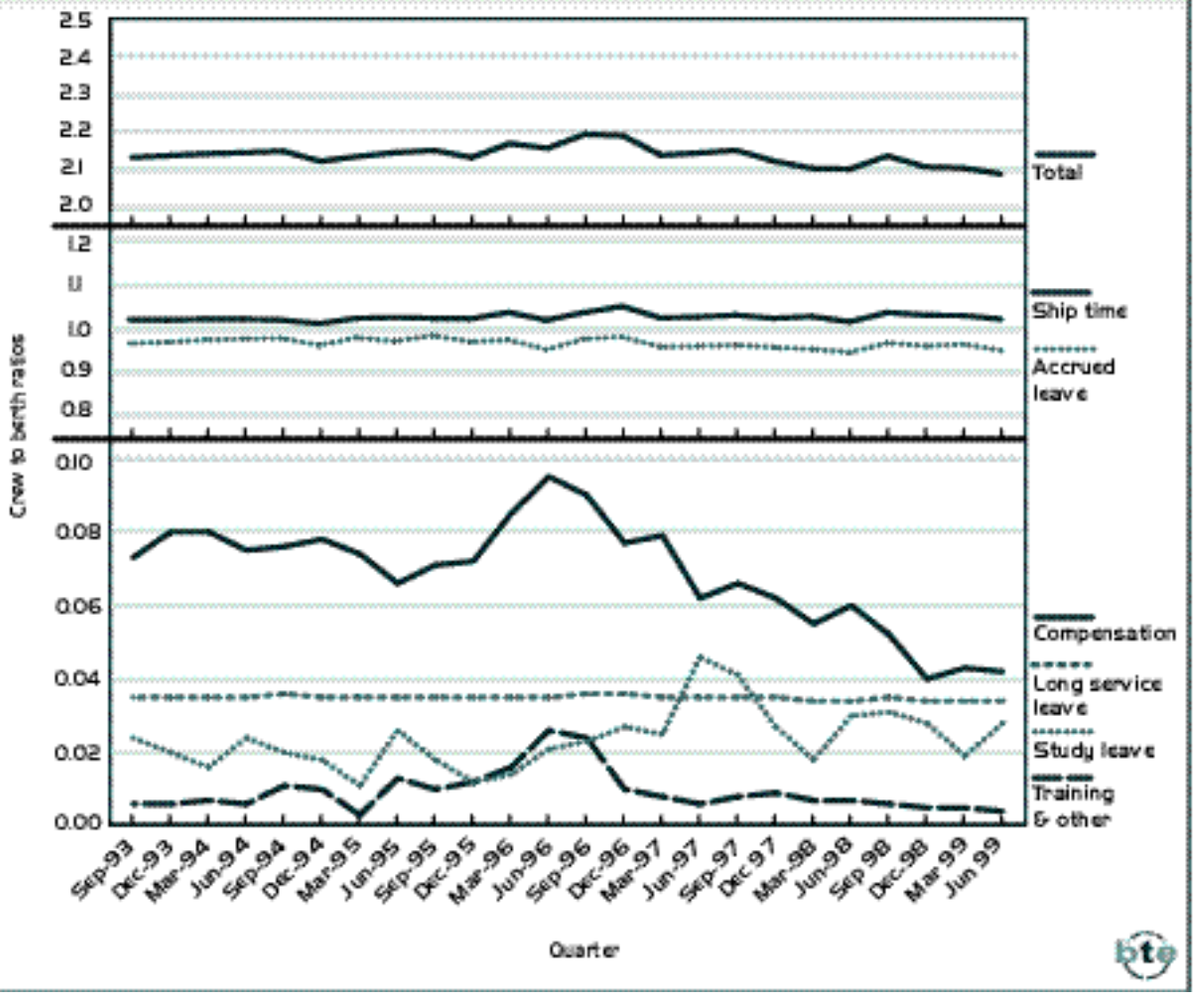


TABLE 10 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, JUNE QUARTER 1999[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.034	0.962	0.022	0.035	0.047	0.013	2.112
Engineers	1.036	0.963	0.030	0.035	0.064	0.002	2.129
All officers	**1.035**	**0.962**	**0.026**	**0.035**	**0.056**	**0.007**	**2.121**
Integrated ratings	1.019	0.948	0.049	0.034	0.000	0.001	2.051
Catering crew	1.018	0.948	0.082	0.034	0.000	0.001	2.083
All ratings	**1.019**	**0.948**	**0.057**	**0.034**	**0.000**	**0.001**	**2.058**
All crew	**1.026**	**0.955**	**0.042**	**0.034**	**0.027**	**0.004**	**2.089**
Previous quarter	1.034	0.969	0.043	0.034	0.019	0.005	2.105
Initial level[b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for September quarter 1993.
Source Data provided by ship operators.

FIGURE II CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

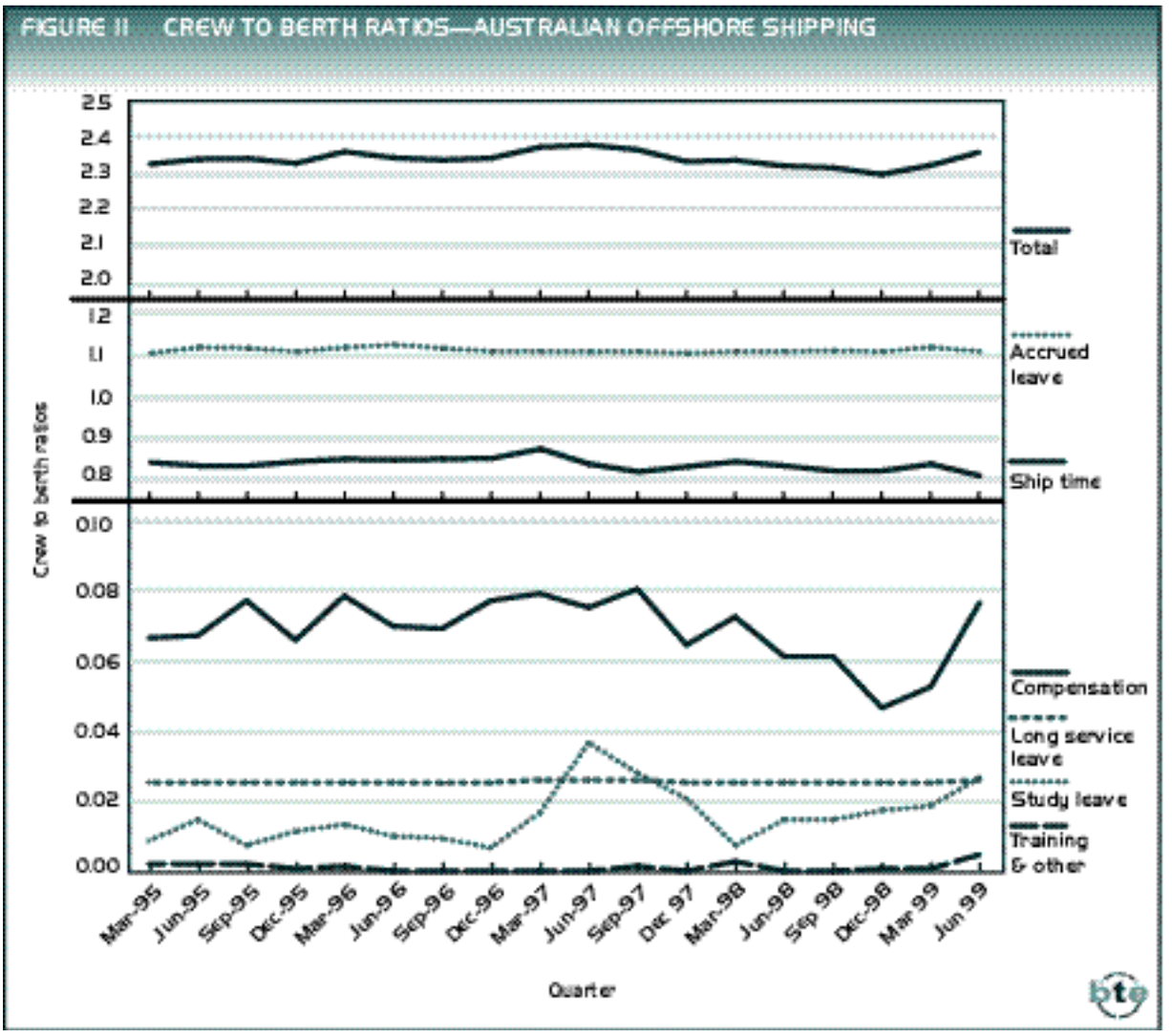


TABLE II MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, JUNE QUARTER 1999p

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.006	1.153	0.080	0.038	0.035	0.002	2.314
Engineers	1.005	1.153	0.025	0.038	0.105	0.019	2.345
All officers	**1.006**	**1.153**	**0.049**	**0.038**	**0.074**	**0.012**	**2.331**
Integrated ratings	1.006	1.153	0.212	0.039	0.000	0.003	2.414
Catering crew	1.003	1.153	0.169	0.039	0.000	0.002	2.366
All ratings	**1.005**	**1.153**	**0.192**	**0.039**	**0.000**	**0.002**	**2.391**
All crew	**1.005**	**1.153**	**0.115**	**0.039**	**0.040**	**0.007**	**2.359**
Previous quarter	1.019	1.158	0.079	0.038	0.028	0.001	2.323
Initial level[b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for September quarter 1993.
Source Data provided by ship operators.

The accrued leave ratio for the June quarter fell to 1.153, compared with 1.158 in the March quarter.

Ship time also represents a significant part of the offshore crew to berth ratio and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio fell to 1.005 in the June quarter, compared with 1.019 in the March quarter.

Other components of the offshore crew to berth ratio were:

- compensation leave, which rose to 0.115, compared with 0.079 in the March quarter, representing an increase of about 46 per cent compared with the previous quarter;
- long service leave, which rose marginally to 0.039, compared with 0.038 in the March quarter;
- study leave, which rose to 0.040, compared with 0.028 in the March quarter; and
- training and other leave, which rose to 0.007, compared with 0.001 in the March quarter.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BTE	Bureau of Transport Economics
GRT	Gross Registered Tonnage
MSC	Mediterranean Shipping Company
MUA	Maritime Union of Australia
NRT	Net Registered Tonnage
teu	Twenty-foot equivalent unit

DEFINITIONS

Elapsed time —the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed rate —the number of containers or teus moved per elapsed hour.

Net time —the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net rate —the number of containers or teus moved per net hour.

Crane rate —the number of containers or teus moved per net crane hour.

Issue number 21 of Waterline is due for release mid December 1999

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TABLE 12 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS— PRODUCTIVITY IN TEUS PER HOUR

	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99
Five ports														
Ships handled	748	827	871	907	865	891	907	963	909	845	1020	942	942	958
Total teus	411538	440098	497140	519206	441697	483372	549247	585474	527881	514409	633107	612019	573444	602501
Crane rate	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5	25.9
Elapsed rate	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na	na	na
Net rate	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2	37.3
Brisbane														
Ships handled	124	133	140	141	156	164	162	177	170	168	192	180	176	193
Total teus	39037	51008	66115	62904	47471	65572	73184	71043	58857	74023	87373	84200	75444	88311
Crane rate	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6	23.4
Elapsed rate	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3	26.7
Net rate	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6	32.2
Sydney														
Ships handled	206	216	228	249	251	249	243	266	238	219	267	230	221	243
Total teus	146038	148290	156344	174982	158323	167705	183978	201535	176496	168234	209619	203042	187287	203536
Crane rate	19.5	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4	23.2	24.0
Elapsed rate	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6	29.3
Net rate	28.0	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3	38.8	38.0
Melbourne														
Ships handled	228	262	274	282	230	249	268	281	276	234	309	274	271	282
Total teus	162911	170884	203371	202376	162156	177070	208200	223465	207346	185803	242456	219549	206727	215379
Crane rate	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5	28.1
Elapsed rate	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2	33.1
Net rate	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9	39.7
Adelaide														
Ships handled	47	63	70	74	69	65	68	66	60	66	63	74	73	66
Total teus	15955	18803	20519	23351	21963	20933	25982	25188	22260	27975	25493	32556	31326	29569
Crane rate	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0	27.9
Elapsed rate	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8	36.3
Net rate	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7	37.6
Fremantle														
Ships handled	143	153	159	161	159	164	166	173	165	158	189	184	201	174
Total teus	47597	51113	50791	55593	51784	52092	57903	64243	62922	58374	68166	72672	72660	65706
Crane rate	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6	27.3
Elapsed rate	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na	na
Net rate	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0	33.4

na not available

Notes 1. *The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the* major industrial disputation with the MUA.

2. *Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures* (except at Adelaide) due to changes in a terminal operator's information systems.

3. *For data back to the December quarter 1989, refer to Waterline 15.*

Sources *Patrick, P&O Ports and Sea-Land.*

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Stevedoring productivity

Table 1 presents the September quarter 1997 to September quarter 1999 indicators of stevedoring productivity at the five major Australian container terminals, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to September quarter 1999 period. The data for Brisbane, Sydney, Melbourne and Fremantle are weighted averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal.

Overall, national stevedoring productivity, as measured by the five-port average, was down marginally in the September quarter 1999 compared with the peak level of stevedoring productivity attained in the June quarter 1999.

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 19.6 containers per hour for the September quarter compared with 20.3 in the June quarter;
- the five-port average *elapsed rate* (productivity *per ship* based on the time labour is aboard the ship) was 23.1 containers per hour for the September quarter compared with 24.0 in the June quarter; and
- the five-port average *net rate* (productivity *per ship* while the ship is worked) was 28.9 containers per hour for the September quarter compared with 29.0 in the June quarter.

Although there was a fall in the crane rate indicator at all ports, the net ship rate indicator rose at Sydney, Adelaide and Fremantle, reflecting higher crane intensities (the number of cranes used per ship).

The marginal fall in stevedoring productivity for the September quarter 1999 mainly reflects the problems encountered at P&O terminals during the recent phasing in of new enterprise agreements, which included a reduction of the workforce in excess of 30 per cent. Over the quarter, the Sea-Land terminal at Adelaide managed to largely maintain its productivity, as did the Patrick terminal at Melbourne. On a more positive note, productivity at Brisbane, Sydney and Fremantle Patrick terminals continued to improve. The new enterprise agreement at the Adelaide Sea-Land terminal was approved in mid-1999, while the agreement covering all Patrick terminals was introduced in September 1998.

The *Brisbane* average crane rate was 18.6 containers per hour in the September quarter, down from 18.9 in the June quarter. The Brisbane elapsed rate of 19.5 containers per hour and the net rate of 24.7 containers per hour were both down on the June quarter figures. The average proportion of elapsed time not worked increased to approximately 21 per cent.

Articles in this issue

The *Sydney* average crane rate was 18.0 containers per hour in the September quarter, down from 18.2 in the June quarter. The Sydney elapsed rate of 23.1 containers per hour and the net rate of 29.4 containers per hour were both up on the June quarter figures. The average proportion of elapsed time not worked decreased to approximately 21 per cent.

The *Melbourne* average crane rate was 20.8 containers per hour in the September quarter, down from 21.8 in the June quarter. The Melbourne elapsed rate of 24.5 containers per hour and the net rate of 30.2 containers per hour were both down on the June quarter figures. The average proportion of elapsed time not worked increased to approximately 19 per cent.

The *Adelaide* average crane rate was 23.0 containers per hour in the September quarter, down from 23.1 in the June quarter. The Adelaide elapsed rate of 29.4 containers per hour was down, while the net rate of 31.5 containers per hour was up, on the June quarter figure. The average proportion of elapsed time not worked increased to approximately 7 per cent.

The *Fremantle* average crane rate was 20.7 containers per hour in the September quarter, down from 21.7 containers per hour in the June quarter. The elapsed rate, unavailable the previous six quarters, was 20.4 containers per hour; and the net rate of 28.0 containers per hour was up on the June quarter figure. The average proportion of elapsed time not worked was approximately 27 per cent.

Container Port Activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The September quarter 1999 five-port average showed ship visits increased by 2 per cent, and container throughput increased by 8 per cent, compared with the June quarter. Only at Adelaide and Fremantle did the container throughput fall below the June quarter 1999 figure. Compared with the September quarter of the previous year the five-port average for container ship visits decreased by 4 per cent, while the five-port average for container throughput increased by 3 per cent.

On a port-by-port basis, the September quarter 1999 *container exchange* at:

- Brisbane was up 10 per cent on the June quarter figure, and up 11 per cent compared with the September quarter 1998;
- Sydney was up 11 per cent on the June quarter figure, and up 7 per cent compared with the September quarter 1998;
- Melbourne was up 9 per cent on the June quarter figure, and down 2 per cent compared with the September quarter 1998;
- Adelaide was down 2 per cent on the June quarter figure, and up 12 per cent compared with the September quarter 1998; and
- Fremantle was down 2 per cent on the June quarter figure, and down 6 per cent compared with the September quarter 1998.

In this issue of *Waterline*, table 1 includes the average of containers exchanged per ship. This activity indicator demonstrates the difference in the stevedoring task for the major ports of Sydney and Melbourne compared with Brisbane, Adelaide and Fremantle.

All else being equal, the higher the exchange per port call, the easier it is to stevedore the ship, as there are fewer re-stows. Consequently, the performance of Adelaide and Fremantle, as measured by the crane rate indicator, could be viewed favourably when compared with Melbourne. On the other hand, the performance of Sydney could be viewed less favourably when compared with Brisbane. However, a higher crane intensity allows Sydney to achieve a net rate higher than Brisbane.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS— PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port / Indicator	**Sep-97**	**Dec-97**	**Mar-98**	**Jun-98**	**Sep-98**	**Dec-98**	**Mar-99**	**Jun-99**	**Sep-99**
Five ports									
Ships handled	907	963	909	845	1020	942	942	958	979
Total containers	431853	467122	421769	406938	493502	477744	448224	469742	506696
Crane rate	18.3	18.5	18.8	18.7	19.1	18.9	19.9	20.3	19.6
Elapsed rate	20.4	20.5	20.0[a]	20.7[a]	20.7[a]	21.9[a]	23.1[a]	24.0[a]	23.1
Net rate	24.3	24.3	23.4	24.7	24.2	26.9	28.2	29.0	28.9
Brisbane									
Ships handled	162	177	170	168	192	180	176	193	224
Total containers	58424	58014	49197	58939	70200	67691	61204	71008	77914
Containers handled per ship (average)	361	328	289	351	366	376	348	368	348
Crane rate	16.1	16.8	18.0	17.3	18.2	16.8	18.3	18.9	18.6
Elapsed rate	16.8	16.8	16.4	17.1	18.7	19.6	21.2	21.4	19.5
Net rate	19.1	19.6	19.1	20.2	21.9	22.9	24.7	25.9	24.7
Elapsed time not worked (per cent)	12	15	14	15	15	14	14	18	21
Sydney									
Ships handled	243	266	238	219	267	230	221	243	259
Total containers	142659	157430	137600	130513	160007	155063	142767	154062	170684
Containers handled per ship (average)	587	592	578	596	599	674	646	634	659
Crane rate	18.2	18.4	17.5	16.9	16.5	15.7	17.7	18.2	18.0
Elapsed rate	21.7	21.9	19.9	20.2	19.2	18.9	22.6	22.2	23.1
Net rate	27.9	27.7	25.7	26.2	24.2	24.6	29.5	28.7	29.4
Elapsed time not worked (per cent)	22	21	23	23	21	23	24	24	21
Melbourne									
Ships handled	268	281	276	234	309	274	271	282	278
Total containers	162591	178302	166284	147122	187696	170056	161894	167942	183058
Containers handled per ship (average)	607	635	602	629	607	621	597	596	658
Crane rate	18.6	18.8	19.5	19.2	20.2	21.5	21.5	21.8	20.8
Elapsed rate	20.5	19.9	20.1	21.0	21.8	24.3	23.6	25.8	24.5
Net rate	23.5	22.6	22.7	24.2	24.5	30.7	28.8	31.0	30.2
Elapsed time not worked (per cent)	13	12	12	13	11	21	18	17	19
Adelaide									
Ships handled	68	66	60	66	63	74	73	66	62
Total containers	20974	20773	18163	23293	21444	26319	24221	24445	23969
Containers handled per ship (average)	308	315	303	353	340	356	332	370	387
Crane rate	21.1	21.4	22.5	23.1	23.2	23.2	23.2	23.1	23.0
Elapsed rate	28.4	29.2	29.6	30.4	29.0	29.3	28.5	30.0	29.4
Net rate	29.2	30.1	30.7	31.5	30.3	30.4	30.7	31.1	31.5
Elapsed time not worked (per cent)	3	3	4	3	4	4	7	4	7
Fremantle									
Ships handled	166	173	165	158	189	184	201	174	156
Total containers	47205	52603	50525	47071	54155	58615	58138	52285	51071
Containers handled per ship (average)	284	304	306	298	287	319	289	300	327
Crane rate	18.8	18.9	19.6	21.5	22.2	20.7	21.4	21.7	20.7
Elapsed rate	17.0	18.9	na	na	na	na	na	na	20.4
Net rate	20.6	23.2	21.1	23.9	23.8	25.5	25.6	26.6	28.0
Elapsed time not worked (per cent)	18	18	na	na	na	na	na	na	27

na not available
a. Four port average only as Fremantle elapsed rate data are not available .
Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.
2. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 13.
3. Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.
Sources Patrick, P&O Ports and Sea-Land.

Teus per hour

Table 13 presents the stevedoring productivity indicators in terms of *teus per hour*. These data are retained in *Waterline* for the purpose of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20 foot and 40 foot containers from one period to the next.

CONTAINER TERMINALS' PRODUCTIVITY

FIGURE 1 FIVE MAJOR PORTS

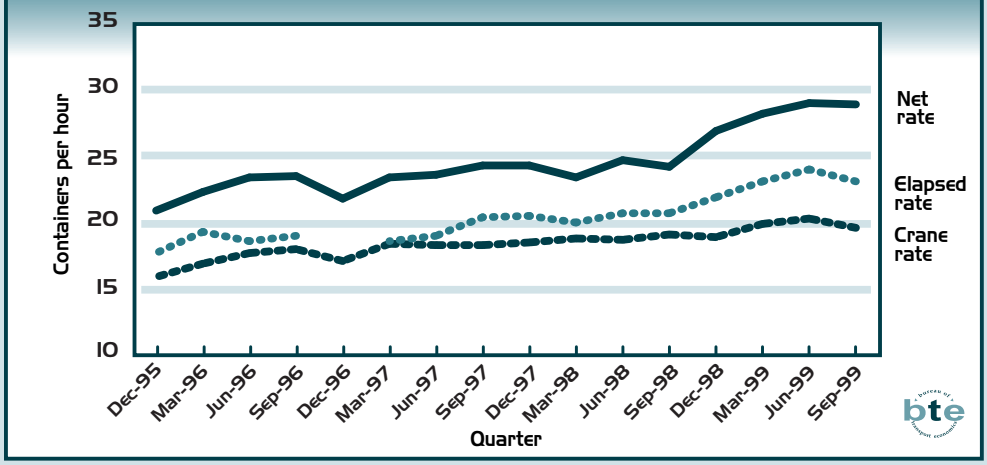


FIGURE 2 BRISBANE

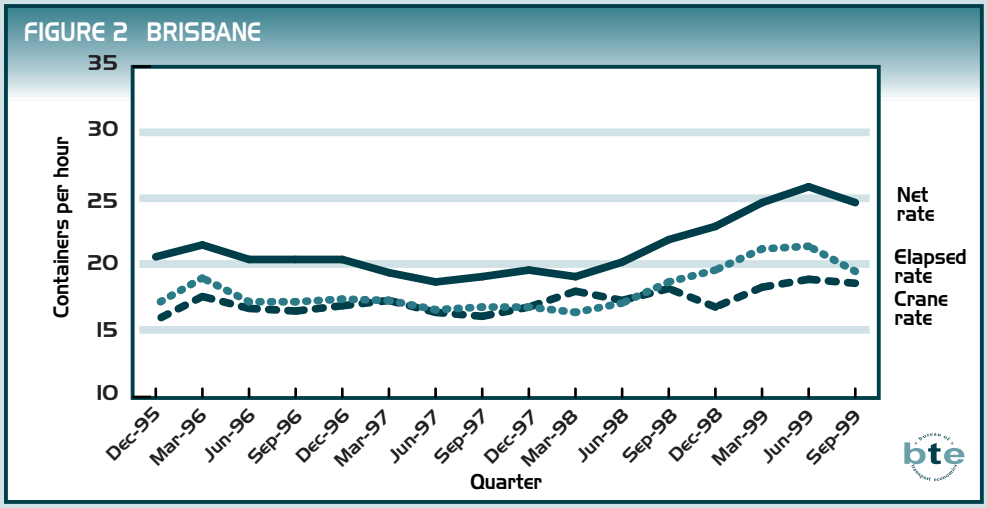
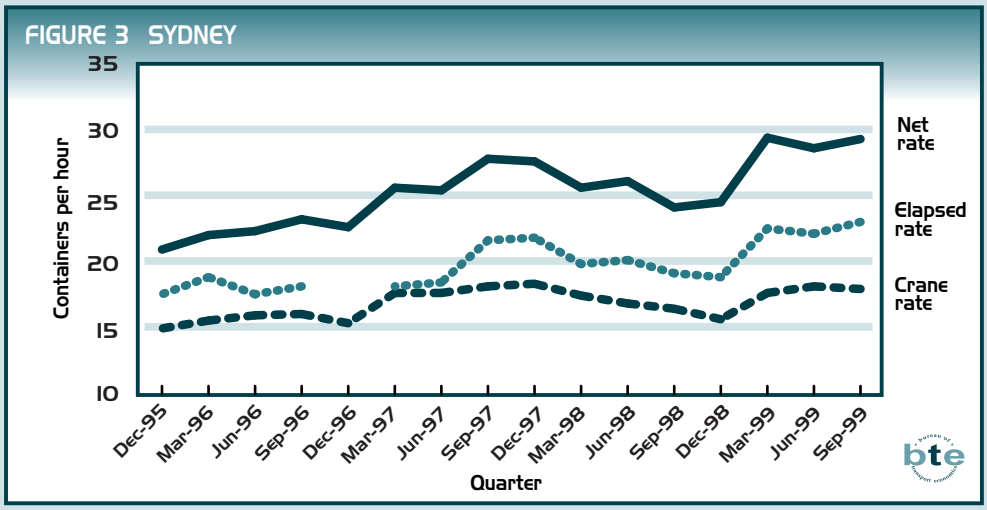


FIGURE 3 SYDNEY



Note *These figures are based on the data contained in table I. Readers should refer to the notes in that table.*

Sources *Patrick, P&O Ports and Sea-Land.*

CONTAINER TERMINALS' PRODUCTIVITY

FIGURE 4 MELBOURNE

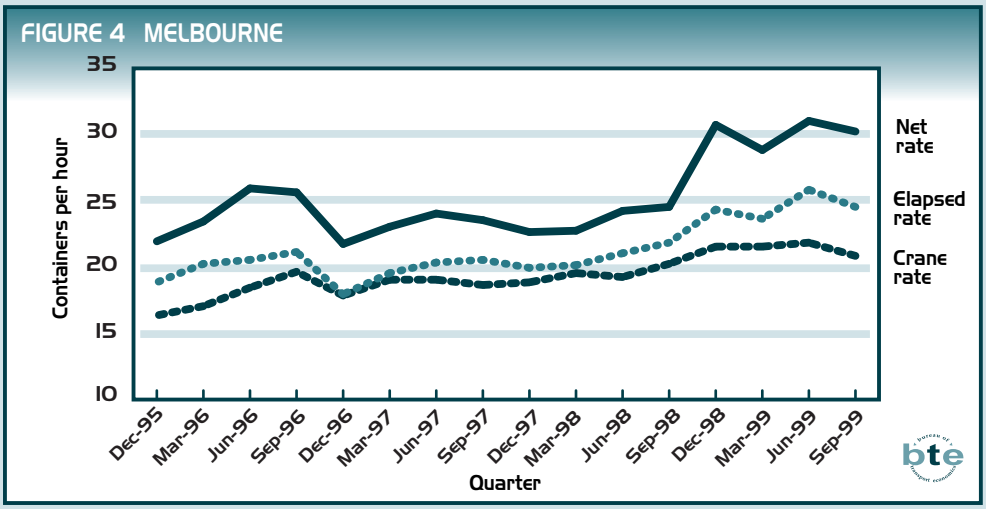


FIGURE 5 ADELAIDE

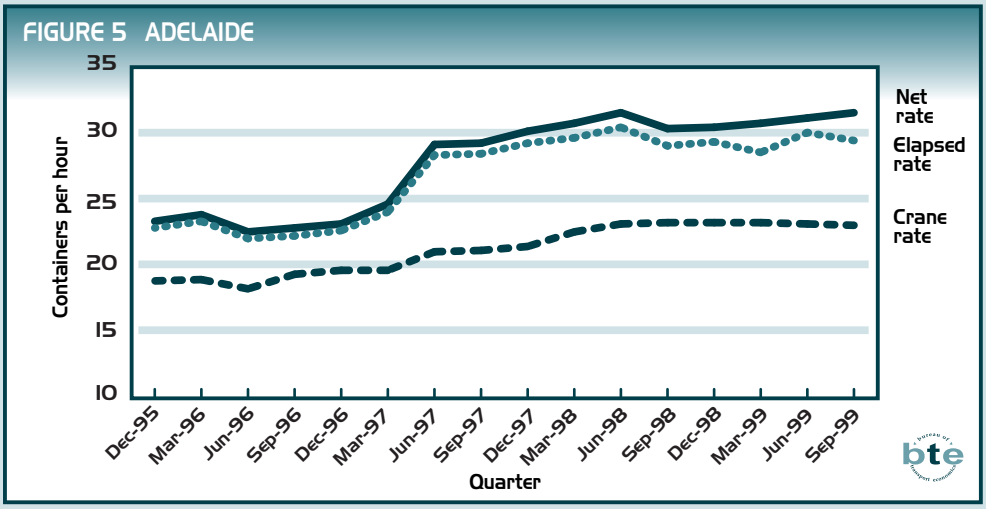
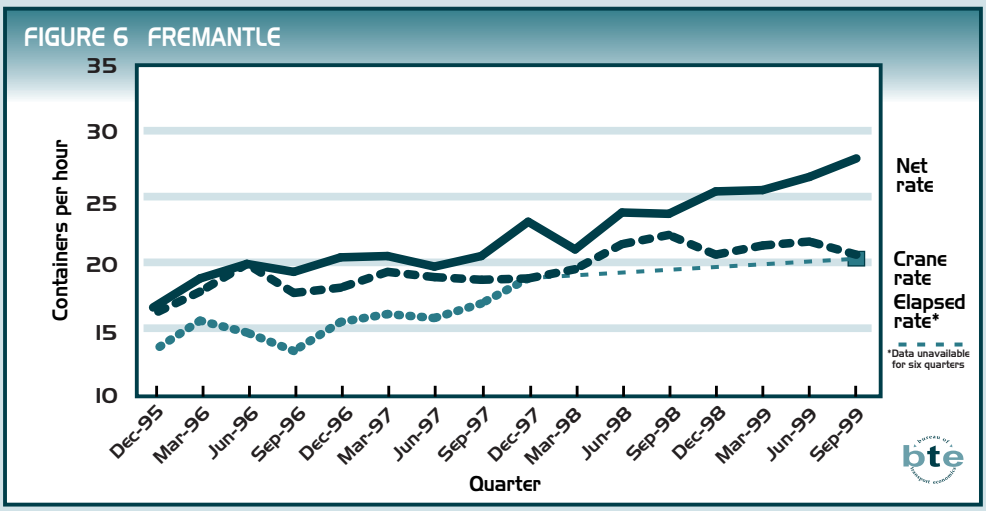


FIGURE 6 FREMANTLE



Note *These figures are based on the data contained in table I. Readers should refer to the notes in that table.*

Sources *Patrick, P&O Ports and Sea-Land.*

COASTAL SHIPPING PERMITS

During the financial year 1998/99, the overall tonnage of cargo moved under a combination of single voyage permits (SVPs) and continuing voyage permits (CVPs) increased by 40 per cent (from 5,193,854 to 7,284,303 tonnes) compared with the previous financial year, and by 563 per cent (from 1,098,329 to 7,284,303 tonnes) compared with 1990/91. The increasing amount of coastal trade moved by way of coastal permits over the past eight years clearly reflects both an increase in shippers' (cargo owners') requirements that is not being met by local ship operators, and the reduced administrative burden for foreign ship operators obtaining coastal shipping permits, particularly CVPs. The increased number of permits issued over this period has been especially marked in the bulk trades.

TABLE 2 SINGLE VOYAGE PERMITS ISSUED

Year	September quarter Permits	Tonnes	December quarter Permits	Tonnes	March quarter Permits	Tonnes	June quarter Permits	Tonnes	FINANCIAL YEAR TOTAL Permits	Tonnes
1990/91	32	195 711	38	450 622	44	262 431	26	189 565	140	1 098 329
1991/92	34	422 161	61	414 191	49	243 049	59	241 373	203	1 320 774
1992/93	62	238 017	69	147 514	83	211 430	93	298 769	307	895 730
1993/94	108	202 252	125	292 664	119	412 029	118	498 571	470	1 405 516
1994/95	110	899 222	112	970 068	116	832 308	90	665 499	428	3 367 097
1995/96	91	1 077 022	100	653 940	107	575 662	123	930 077	421	3 236 701
1996/97	142	1 026 438	146	1 110 332	135	661 784	149	1 056 709	572	3 855 263
1997/98	197	1 307 362	214	1 009 151	184	1 266 030	184	1 301 204	779	4 883 747
1998/99	186	1 584 240	187	1 580 034	144	1 336 882	187	2 381 904	704	6 883 060
1999/00	168	1 799 908								

Note *From mid-1997, the data have been collected as SVPs issued; prior data were collected as SVPs used. As most SVPs issued are also used, the differences in the data are likely to be insignificant.*

Source *Cross-Modal & Maritime Transport Division of the Department of Transport & Regional Services.*

Single voyage permits

Table 2 updates the information published in *Waterline 19*. It presents data on the number of SVPs issued, and tonnes of cargo carried, over the period from the September quarter 1990 to September quarter 1999. The number of SVPs issued in the September quarter 1999 declined by 10 per cent compared with the June quarter 1999, while the associated tonnes of cargo carried declined by 24 per cent.

Total SVPs issued in the 1998/99 financial year declined by about 11 per cent compared with the number issued in 1997/98, but was 403 per cent up on the number issued back in 1990/91. Tonnes of cargo carried using SVPs increased by 33 per cent compared with 1997/98, and was 527 per cent higher than the 1990/91 level of tonnage. The indicators for the past year show that although the total number of SVPs issued has declined, the associated total tonnage carried has actually increased. The decline in SVPs issued may be a reflection of the marked increase in CVPs issued over the past year.

TABLE 3 SUMMARY OF SINGLE VOYAGE PERMITS ISSUED AND CARGO COMMITTED, SEPTEMBER QUARTER 1999

Cargo Category	Permits issued	Tonnes committed
Petroleum Products	18	290 515
Crude Oil & Feedstocks	15	723 000
Liquefied Gas	9	31 120
Other Bulk Liquids	2	5 180
Dry Bulk	28	590 950
General Cargo		
- containerised	86	156 306
- break bulk	10	2 837
Total	**168**	**1 799 908**

Source *Cross-Modal & Maritime Transport Division of the Department of Transport & Regional Services.*

Table 3 shows a breakdown of SVPs by cargo types for the September quarter 1999. Containerised cargo permits continue to be the major component of the total number of

TABLE 4 CONTINUING VOYAGE PERMITS ISSUED

Year	September quarter Permits	Tonnes[a]	December quarter Permits	Tonnes[a]	March quarter Permits	Tonnes[a]	June quarter Permits	Tonnes[a]	FINANCIAL YEAR TOTAL Permits	Tonnes[a]
1998/99	3	35 820	12	140 270	4	53 400	22	171 753	41	401 243
1999/00	14	127 011								

a. *Tonnes committed to be carried under the permits.*

Source Cross-Modal & Maritime Transport Division of the Department of Transport & Regional Services.

permits issued. On the other hand, bulk cargo continues to account for around 90 per cent of total tonnage moved under permit.

Continuing Voyage Permits

While CVPs have been available for some time, they were rarely requested or issued. However, during the 1998/99 financial year, 41 CVPs were issued. Each CVP covers a six-month period which may otherwise have required some six or seven SVPs. Continuing voyage permits can thus provide efficiencies and cost savings for vessels making multiple visits to Australian ports over short periods. From table 4 we can see that, over the past four complete quarters, approximately 492,434 tonnes of coastal trade were moved using CVPs.

General information

Part VI of the *Navigation Act 1912* provides for licensed vessels to carry passengers and cargo in the coasting trade. The Act does not restrict the class of vessels that may obtain a coasting trade licence. Any ship, regardless of registry, is able to obtain a licence provided the crew is paid Australian wage rates while it is engaged in the coasting trade, and the ship is not in receipt of foreign government subsidies nor received such a subsidy in the previous twelve months.

Ships that obtain a licence must also conform to the requirements of the *Navigation Act 1912*, including: specified safety; manning; and crew qualifications, rehabilitation and compensation provisions. Where suitable licensed vessels are not available, the Act also provides for the issue of single or continuing voyage permits to unlicensed vessels—where this is considered to be in the public interest. The application fee for a passenger SVP is $22 and for a cargo SVP is $200. The application fee for a CVP is $400.

More information on coastal permits can be found on the Department of Transport and Regional Services' internet site at: **http://www.dotrs.gov.au/**

COASTAL FREIGHT IN AUSTRALIA

The BTE data services team collects coastal shipping data annually from all Australian ports. The data are primarily used to calculate the coastal freight task around Australia. The results of these analyses are published annually as an information paper, the most recent being Information Paper 45, *Coastal Freight in Australia, 1997/98*.

The port data collected are stored in an Access database and are available for future analyses. The BTE took over the collection in 1997 and has published three years of

TABLE 5 AUSTRALIAN COASTAL FREIGHT SUMMARY, 1993/94–1997/98

	Loaded (kilotonnes)			Discharged (kilotonnes)		
Year	Interstate	Intrastate	Total[a]	Interstate	Intrastate	Total[a]
1993/94	30 769	14 505	45 274	31 748	14 228	45 976
1994/95	33 692	15 498	49 190	34 180	16 286	50 466
1995/96	31 982	15 815	47 798	31 808	16 229	48 037
1996/97	32 581	16 562	49 144	32 505	17 530	50 035
1997/98	34 322	18 200	52 522	34 741	18 968	53 710

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

Note Reasons for discrepancies between loaded and discharged tonnages in this and other tables are listed in the 'Statistical issues' section on page 9.

Source Australian port authorities—personal communications.

analyses, 1995/96, 1996/97 and 1997/98. The BTE is presently collecting data for the 1998/99 information paper. It is expected that this paper will be published in May 2000. For further information about these papers and their databases, please contact the BTE data team by email at **data.team@dotrs.gov.au** or by telephone on 02 6274 6751.

Tables 5 to 7 and the following text is an extract from *Coastal Freight in Australia, 1997/98*.

Scope and coverage

This publication contains details of interstate and intrastate cargo loaded and discharged at Australian ports for the financial year 1997/98. It excludes trade from small craft at isolated locations in northern and western regions of Australia. Cargo loaded or discharged at Christmas Island, the Cocos (Keeling) Islands and Norfolk Island is also excluded.

TABLE 6 COASTAL FREIGHT FLOWS BETWEEN AUSTRALIAN PORTS, 1997/98

Port of destination

kilotonnes

Port of origin	Syd	Rest of NSW	Melb	Rest of Vic	Bris	Rest of Qld	Adel	Rest of SA	Frem	Rest of WA	Hobart	Rest of Tas	Darwin	Rest of NT	Total
Sydney	0	1 445	44	45	302	40	10	0	74	1	32	284	13	0	2 290
Rest of NSW	3	1 640	147	1 130	164	212	21	1 103	0	26	16	104	15	0	4 582
Melbourne	338	18	49	0	129	242	120	63	108	240	158	1 185	70	0	2 719
Rest of Vic	3 122	38	0	8	1 581	33	61	0	25	0	212	177	0	0	5 259
Brisbane	175	2	24	14	1	1 820	9	0	23	0	0	18	9	0	2 096
Rest of Qld	285	1 274	349	128	169	8 549	0	186	28	0	5	51	39	0	11 061
Adelaide	124	90	710	27	445	0	8	36	9	162	0	0	0	0	1 612
Rest of SA	421	1 692	775	0	253	0	1 638	0	0	33	138	129	0	0	5 079
Fremantle	0	30	55	806	162	4	23	0	0	963	10	99	200	0	2 353
Rest of WA	1 256	6 856	276	362	18	0	1 026	0	1 188	410	0	0	1	0	11 393
Hobart	0	0	378	0	0	0	0	0	0	0	0	0	0	0	378
Rest of Tas	352	473	1 853	0	0	0	1	40	48	41	224	23	2	0	3 057
Darwin	0	1	0	4	0	0	0	0	6	39	11	0	16	0	77
Rest of NT	0	96	0	0	0	0	29	0	0	0	0	433	9	0	566
Total[a]	**6 076**	**13 655**	**4 660**	**2 524**	**3 225**	**10 900**	**2 947**	**1 428**	**1 509**	**1 915**	**807**	**2 503**	**374**	**0**	**52 522**

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

Source Australian port authorities—personal communications.

Sources

Tonnage figures and pack details have been derived from data supplied by port authorities.

To obtain tonne-kilometre figures, a port-to-port distance figure (including pilotage) was applied to individual port tonnages. Where optional routes within Australia could reasonably be used, the shorter distance has been used. The main reference for distances was *The Ports of Australia*, 13th edition, 1993, published by the Australian Chamber of Shipping.

Definitions

Australian Transport Freight Commodity Code Classification (ATFCC)

A systematic classification of commodities transported by sea, air, road, rail and pipeline, developed jointly by the former Commonwealth Department of Transport and the Australian Bureau of Statistics. It has been designed to facilitate standardised classification of goods carried by these modes to, from and within Australia. The ATFCC is aligned with the Standard International Trade Classification (SITC) at divisional (2-digit) level of classification.

Freight

Includes all cargo lifted, including empty containers, but excludes ship stores and bunkers.

tonne-kilometres

The product of tonnes of freight carried between two ports and the sea route distance, including pilotage, between the two ports.

Statistical issues

Statistics provided by port authorities on tonnages loaded and discharged do not always balance. The most common reasons for this lack of consistency are:

- Port authorities record cargo as having been discharged during the month the vessel arrives in port. Similarly, cargo loaded is recorded against the month of the vessel's departure. Consequently, cargo loaded at the end of June and discharged in early July will not be recorded in the same financial year by the two ports. The effect of this may be offset to some degree at the end of the financial year, when the reverse applies.
- A port authority's record of cargo loaded and discharged is based on information provided by the ships' agents. This information could be incorrect because the agent may provide only summary statistics for different types of cargo. The agent may also not know the true origin or destination of particular consignments, and may therefore record the last or next port of call respectively. This particularly applies to liquid and dry bulk commodities, where the cargo originates from, or is destined for, several ports.
- The commodity recorded by the agent may not be classified in the same way at the ports of loading and discharge. For example, gypsum loaded in South Australia is classified as fertiliser at NSW ports, and petroleum products are classified as kerosene in Cairns.

The BTE has endeavoured to reconcile some of these data problems as far as possible, but takes no responsibility for correctness or accuracy. Reconciliation was not attempted for many of the smaller shipments.

TABLE 7 COASTAL FREIGHT LOADED BY PACK TYPE, 1997/98

State of origin	State of destination: NSW	Vic	Qld	SA	WA	Tas	NT	Total
				kilotonnes				
				Dry bulk				
NSW	2 947	26	250	1 045	9	404	0	4 681
Vic	38	8	21	61	0	13	0	142
Qld	1 526	462	8 621	186	28	56	17	10 895
SA	2 047	600	657	1 606	174	267	0	5 350
WA	6 869	855	4	0	52	2	0	7 782
Tas	814	640	0	40	7	224	0	1 725
NT	96	0	0	0	0	443	13	552
Sub total[a]	14 336	2 591	9 554	2 938	269	1 409	30	31 126
				Liquid bulk				
NSW	77	145	376	9	0	14	13	634
Vic	3 440	0	1 913	173	261	611	70	6 468
Qld	173	45	1 868	9	0	18	0	2 113
SA	278	907	40	44	0	0	0	1 269
WA	1 273	636	150	1 045	2 469	73	185	5 830
Tas	0	161	0	0	0	0	0	161
NT	0	4	0	29	0	0	3	36
Sub total[a]	5 241	1 899	4 348	1 309	2 730	715	270	16 512
				Container				
NSW	3	96	68	1	67	13	5	252
Vic	37	0	50	9	101	640	0	838
Qld	34	8	21	0	21	0	31	115
WA	2	4	1	5	7	0	0	19
SA	0	6	30	4	31	34	12	119
Tas	9	680	0	1	19	12	0	721
NT	0	0	0	0	1	0	0	1
Sub total[a]	85	794	170	20	246	700	49	2 064
				Non bulk				
NSW	61	1 099	23	80	25	6	10	1 304
Vic	1	49	0	1	11	469	0	530
Qld	3	0	29	0	2	0	1	35
SA	1	1	0	28	23	0	0	54
WA	0	1	0	0	10	0	4	15
Tas	3	750	0	0	63	11	2	828
NT	0	0	0	0	44	0	9	54
Sub total[a]	69	1 900	53	108	178	486	25	2 820
Total[a]	**19 731**	**7 183**	**14 125**	**4 375**	**3 424**	**3 310**	**374**	**52 522**

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

Source Australian port authorities—personal communications.

CREW TO BERTH RATIOS

The BTE monitors crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days worked over a period of time, divided by the number of berth days operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 7 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the BTE is still auditing the data, the September quarter 1999 merchant shipping data in this issue of *Waterline* should be regarded as preliminary. The overall crew to berth ratio for merchant shipping increased to 2.103 in the September quarter 1999, compared with 2.089 in the June quarter, but it is lower than the 2.133 figure recorded in the September quarter 1993 when monitoring commenced.

Table 8 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the September quarter 1999. Ship time is the largest

component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio rose to 1.034 in the September quarter, compared with 1.026 in the June quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35-hour week. The accrued leave ratio increased to 0.962 in the September quarter, compared with 0.955 in the June quarter

Other components of the merchant shipping crew to berth ratio were:

- compensation leave, which fell to 0.036, compared with 0.042 in the June quarter, representing a fall of about 50 per cent compared with the September quarter 1993 figure when merchant shipping monitoring began;
- long service leave, which increased to 0.038, compared with 0.034 in the June quarter;
- study leave, which remained constant at 0.027, compared with the June quarter; and
- training and other paid leave, which increased to 0.005, compared with 0.004 in the June quarter.

Offshore shipping

Figure 8 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. As the BTE is still auditing the data, the September quarter 1999 offshore shipping data in this issue of *Waterline* should be regarded as preliminary. The overall crew to berth ratio for offshore shipping fell to 2.317 in the September quarter 1999, compared with 2.359 in the June quarter, and 2.327 in the March quarter 1995 when monitoring commenced.

Table 9 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the September quarter 1999. Accrued leave is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio for the September quarter increased to 1.154, compared with 1.153 in the June quarter.

Ship time also represents a significant part of the offshore crew to berth ratio and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio remained constant at 1.005 in the September quarter, compared with the June quarter.

Other components of the offshore crew to berth ratio were:

- compensation leave, which fell to 0.083, compared with 0.115 in the June quarter, representing a fall of about 28 per cent compared with the previous quarter and a fall of 17 per cent compared with the March quarter 1995 figure when offshore shipping monitoring began;
- long service leave, which fell to 0.038, compared with 0.039 in the June quarter;
- study leave, which fell to 0.037, compared with 0.040 in the June quarter; and
- training and other leave, which fell to zero, compared with 0.007 in the June quarter.

FIGURE 7 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

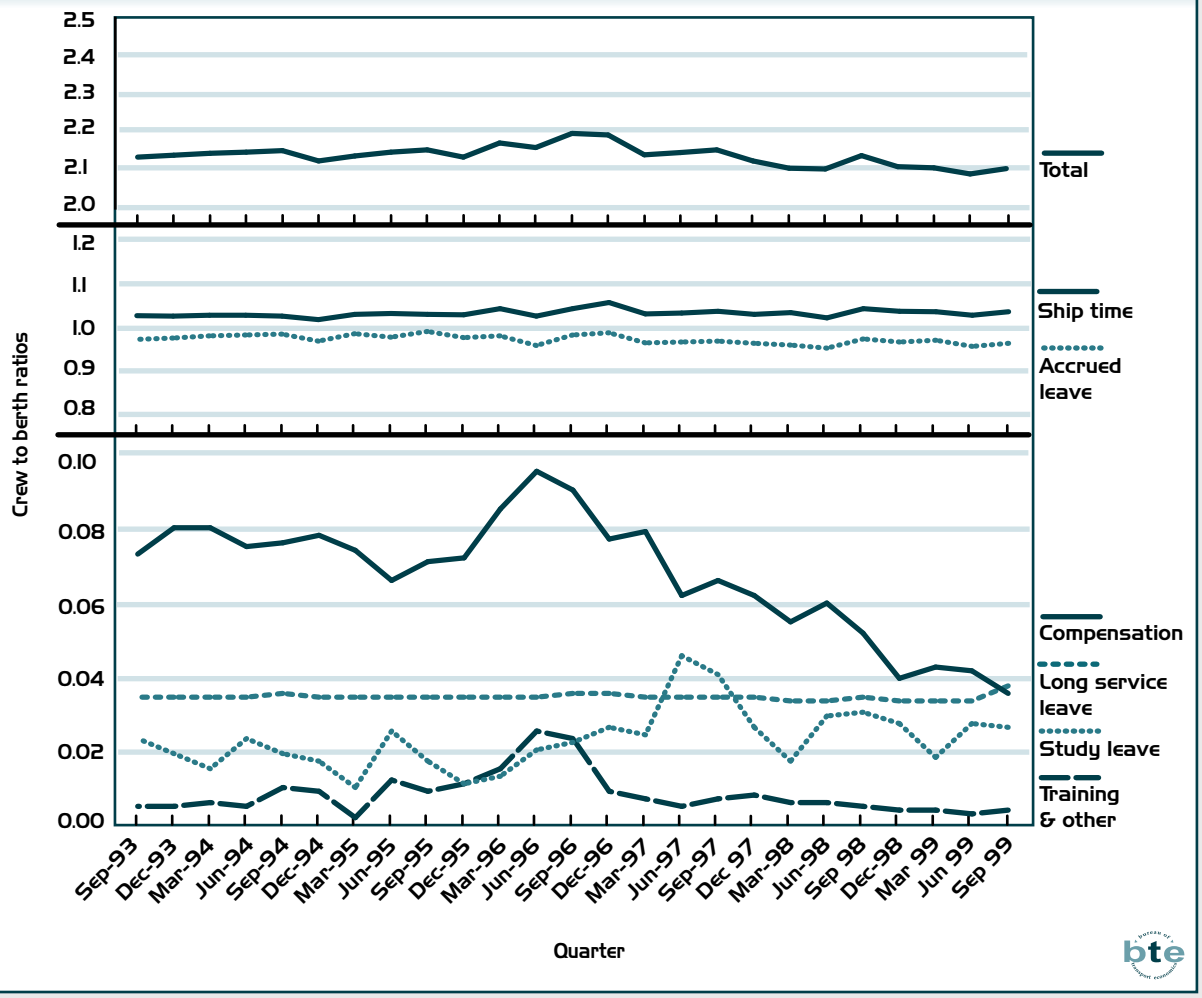


TABLE 8 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1999p

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.054	0.978	0.023	0.039	0.056	0.015	2.164
Engineers	1.059	0.981	0.025	0.039	0.051	0.006	2.161
All officers	**1.057**	**0.980**	**0.024**	**0.039**	**0.053**	**0.010**	**2.163**
Integrated ratings	1.013	0.946	0.042	0.037	0.000	0.000	2.038
Catering crew	1.015	0.947	0.067	0.037	0.008	0.001	2.076
All ratings	**1.013**	**0.946**	**0.048**	**0.037**	**0.002**	**0.000**	**2.047**
All crew	**1.034**	**0.962**	**0.036**	**0.038**	**0.027**	**0.005**	**2.103**
Previous quarter	1.026	0.955	0.042	0.034	0.027	0.004	2.089
Initial level [b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for September quarter 1993.

Source Data provided by ship operators.

FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

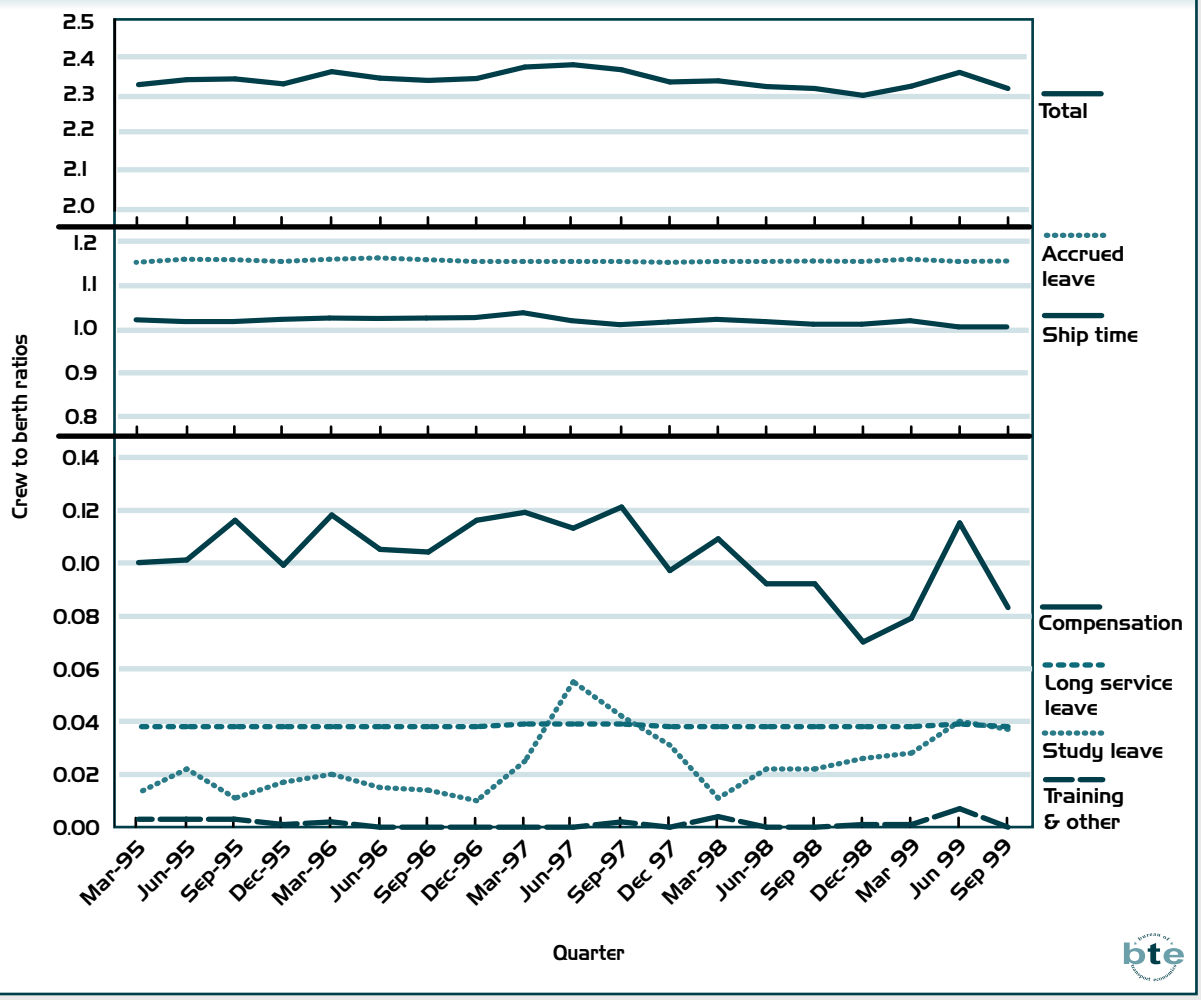


TABLE 9 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1999p

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.006	1.153	0.068	0.038	0.032	0.000	2.297
Engineers	1.006	1.154	0.023	0.038	0.097	0.000	2.318
All officers	**1.006**	**1.154**	**0.043**	**0.038**	**0.069**	**0.000**	**2.309**
Integrated ratings	1.005	1.153	0.174	0.039	0.000	0.000	2.371
Catering crew	1.004	1.154	0.084	0.037	0.000	0.000	2.279
All ratings	**1.005**	**1.154**	**0.129**	**0.038**	**0.000**	**0.000**	**2.325**
All crew	**1.005**	**1.154**	**0.083**	**0.038**	**0.037**	**0.000**	**2.317**
Previous quarter	1.005	1.153	0.115	0.039	0.040	0.007	2.359
Initial level [b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for March quarter 1995.

Source Data provided by ship operators.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. They cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

This article presents data on reliability in the September quarter 1999. It also includes final indicators for the June quarter 1999, which replace the provisional indicators reported in the previous issue of *Waterline*.

Berth availability, pilotage, towage

Table 10 presents information on berth availability, pilotage and towage for a sample of ship calls in the September quarter 1999. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

TABLE 10 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, SEPTEMBER QUARTER 1999

(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5-10	11-20	>20	Total no. of ship calls
Brisbane									
Berth availability	26	0	0	1	0	0	2	0	29
Pilotage	29	0	0	0	0	0	0	0	29
Towage	29	0	0	0	0	0	0	0	29
Sydney									
Berth availability	57	0	1	0	3	1	0	2	64
Pilotage	64	0	0	0	0	0	0	0	64
Towage	64	0	0	0	0	0	0	0	64
Melbourne									
Berth availability	73	1	1	2	1	2	4	5	89
Pilotage	89	0	0	0	0	0	0	0	89
Towage	89	0	0	0	0	0	0	0	89
Adelaide									
Berth availability	15	0	0	1	0	2	0	0	16
Pilotage	16	0	0	0	0	0	0	0	16
Towage	16	0	0	0	0	0	0	0	16
Fremantle									
Berth availability	40	0	0	0	0	0	1	0	41
Pilotage	41	0	0	0	0	0	0	0	41
Towage	41	0	0	0	0	0	0	0	41
Five ports									
Berth availability	211	1	2	4	4	3	7	7	239
Pilotage	239	0	0	0	0	0	0	0	239
Towage	239	0	0	0	0	0	0	0	239

Note *Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns. Sample sizes for several ports are small.*

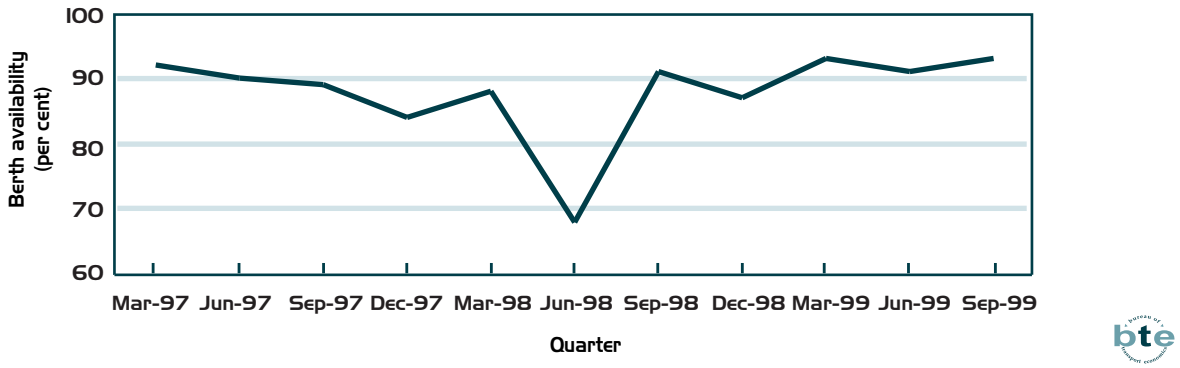
Sources *Data for a sample of ship calls provided by shipping lines.*

The sample for the September quarter 1999 covers 239 ship calls, equivalent to 24 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 13 per cent at Brisbane to 32 per cent at Melbourne. The relatively low proportion for Brisbane partly reflects the unavailability of September quarter 1999 data from one of the shipping lines that participates in the BTE survey.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 93 per cent in the September quarter 1999. This was similar to the figure of 91 per cent that was recorded in the June quarter 1999. Caution should be used in undertaking inter-port comparisons of the berth availability data, as there is significant variation between ports in sample sizes and ship call patterns.

Figure 9 provides information on berth availability over the period since the March quarter 1997.

FIGURE 9 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, MARCH QUARTER 1997 TO SEPTEMBER QUARTER 1999



Sources *Data for a sample of ship calls provided by shipping lines.*

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 22 hours in the September quarter 1999. This was up from the figure of 14 hours that was recorded in the previous quarter.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportions were 100 per cent in the September quarter 1999. That is, pilotage and towage services were provided within one hour of the confirmed time in all surveyed cases. Performance has been at similar levels since the first data (covering the March quarter 1997) were published in *Waterline*.

Revised data provided to the BTE have resulted in an amended figure of 100 per cent for the pilotage indicator at Melbourne in the March quarter 1999 and the June quarter 1999.

Other waiting time

The seven shipping lines that supplied information for table 10 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

TABLE 11 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, SEPTEMBER QUARTER 1999

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5-10	11-20	>20	Total no. of incidents
Stevedoring finished early	19	9	6	7	4	0	0	45
Awaiting labour	2	9	5	4	13	7	3	43
Early ship arrival	4	5	7	3	11	5	1	36
Pilot/tug booking not at preferred time	4	5	2	2	0	0	0	13
Crane breakdown	3	3	1	2	1	0	0	10
Weather or tides	4	1	1	1	4	2	0	13
Industrial action	0	0	1	1	4	0	1	7
Late ship arrival	0	1	1	0	0	1	1	4
Ship repairs or maintenance	0	1	0	1	1	0	1	4
Stevedoring finished late	1	0	0	0	0	0	0	1
Other	4	3	2	3	1	3	0	16
Total incidents	**41**	**37**	**26**	**24**	**39**	**18**	**7**	**192[a]**

a. *These incidents affected 125 of the 239 ship calls covered in table 10.*

Sources *Data for a sample of ship calls provided by shipping lines.*

In the September quarter 1999, 52 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. The corresponding proportion in the June quarter 1999 was 51 per cent. The average dura-

tion of other waiting time incidents was 8.2 hours per incident in the September quarter 1999, compared with 5.9 hours per incident in the previous quarter.

Table 11 summarises the data on other waiting time incidents in the September quarter 1999. The shipping lines identified a total of 192 incidents (affecting 125 ship calls) for the sample of ship calls over this period. These incidents involved both ship-related and waterfront factors.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The data provided by shipping lines indicate that four incident types accounted for around 71 per cent of the total hours attributed to other ship waiting time in the September quarter 1999:

- Awaiting stevedoring labour (31 per cent);
- Early ship arrival (22 per cent);
- Completion of stevedoring earlier than forecast (10 per cent);
- Late ship arrival (8 per cent).

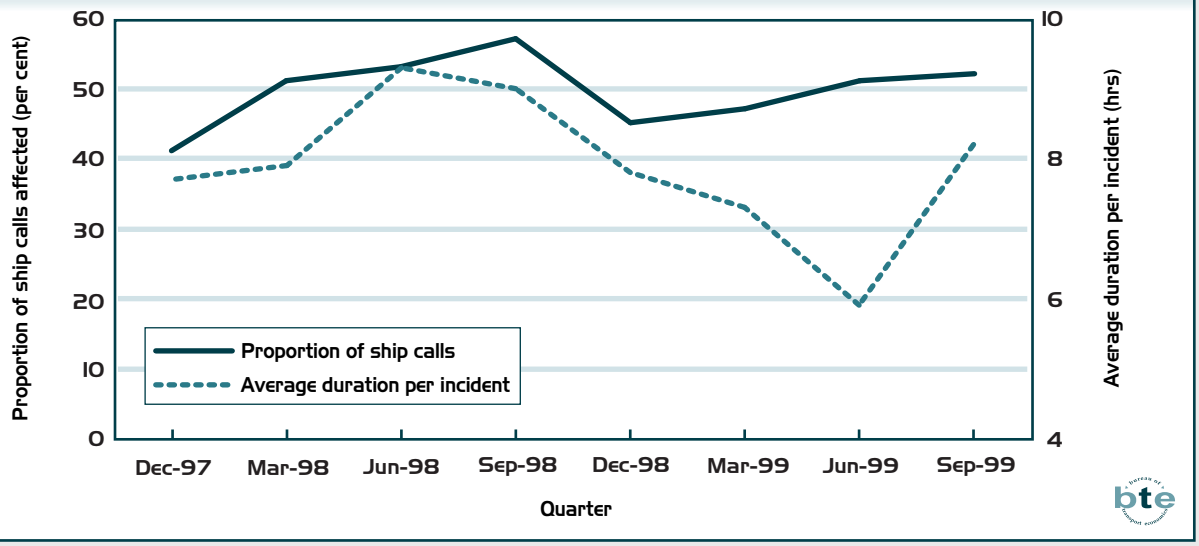
Figure 10 provides information on other ship waiting time over the period since the December quarter 1997. It indicates the proportion of ship calls affected and the average duration per incident in each quarter.

Stevedoring

Table 12 presents the available information on two aspects of stevedoring reliability at major container terminals — stevedoring rate and cargo receival. Data are not available for Adelaide or Fremantle, and partial data for the September quarter 1999 has been obtained for Melbourne. The BTE expects that September quarter 1999 data for Melbourne will be published in the next issue of *Waterline*.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average

FIGURE 10 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, DECEMBER QUARTER 1997 TO SEPTEMBER QUARTER 1999



Sources *Data for a sample of ship calls provided by shipping lines.*

crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. Compared with the previous quarter, the stevedoring rate indicator declined at Brisbane and increased at Sydney.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial indicator of one factor that can affect container terminal performance. Compared with the previous quarter, the cargo receival indicator increased at the two ports for which data are available.

Ship arrival

Table 12 includes data for two indicators of ship arrival advice.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation at *24 hours prior to actual arrival*. Compared with the previous quarter, there were significant declines in this indicator at three ports and little change at the other port.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. The only significant change in the latest period was a large increase at Fremantle, which reversed a significant decline in the previous period.

TABLE 12 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, JUNE AND SEPTEMBER QUARTERS 1999

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**	**Apr–Jun**	**Jul–Sep**
Stevedoring										
Stevedoring rate	51	44	42	48	41	a	na	na	na	na
Cargo receival	84	91	73	77	97	a	na	na	na	na
Ship arrival										
Advice at 24 hrs	70	63	59	53	na	na	76	59	50	52
Advice inside 24 hrs	95	93	96	93	na	na	92	93	75	90

a Data from one terminal operator not available at time of publication.
na not available

Sources AAPMA, Patrick and P&O Ports.

A Farewell and Many Thanks

This is my last issue of *Waterline*. In the New Year, I will be taking up a policy position in the Cross-Modal and Maritime Transport Division of DoTRS. I want to take this opportunity to thank all our data suppliers for their continued support of *Waterline*. It is the willingness of industry stakeholders to provide their data that ensures *Waterline* remains relevant and timely.

Although there are many individuals who have contributed to the success of *Waterline*, I want to say a special thank you to John Hirst (AAPMA), Llew Russell (LSS) and the Hon. Peter Morris (former Member for Shortland). Their encouragement, support and promotion of *Waterline*, particularly in those early days when some saw *Waterline* as yet another ineffectual study, has helped *Waterline* to become an important reference document in the maritime industry.

Of course, the prominence of *Waterline* could not have been achieved without the efforts of my colleagues, Kym Starr and Gita Curnow, and the BTE's publication and design team.

Finally, *Waterline* would never have happened if not for my boss for many years, Neil Gentle. It was Neil who allowed me to pursue the idea of a regular maritime publication, providing great advice and most importantly, championing the cause to ensure management support. For that opportunity, I am very grateful.

Have a safe and happy season, and an efficient and effective New Year.

Anthony Carlson

TABLE 13 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—PRODUCTIVITY IN TEUS PER HOUR

	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99
Five ports															
Ships handled	748	827	871	907	865	891	907	963	909	845	1020	942	942	958	979
Total teus	411 538	440 098	497 140	519 206	441 697	483 372	549 247	585 474	527 881	514 409	633 107	612 019	573 444	602 501	660 593
Crane rate	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5	25.9	25.4
Elapsed rate	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na	na	na	30.1
Net rate	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2	37.3	37.7
Brisbane															
Ships handled	124	133	140	141	156	164	162	177	170	168	192	180	176	193	224
Total teus	39 037	51 008	66 115	62 904	47 471	65 572	73 184	71 043	58 857	74 023	87 373	84 200	75 444	88 311	98 944
Crane rate	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6	23.4	23.3
Elapsed rate	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3	26.7	24.7
Net rate	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6	32.2	31.2
Sydney															
Ships handled	206	216	228	249	251	249	243	266	238	219	267	230	221	243	259
Total teus	146 038	148 290	156 344	174 982	158 323	167 705	183 978	201 535	176 496	168 234	209 619	203 042	187 287	203 536	226 784
Crane rate	19.5	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4	23.2	24.0	23.7
Elapsed rate	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6	29.3	30.6
Net rate	28.0	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3	38.8	38.0	38.9
Melbourne															
Ships handled	228	262	274	282	230	249	268	281	276	234	309	274	271	282	278
Total teus	162 911	170 884	203 371	202 376	162 156	177 070	208 200	223 465	207 346	185 803	242 456	219 549	206 727	215 379	241 775
Crane rate	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5	28.1	27.4
Elapsed rate	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2	33.1	32.4
Net rate	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9	39.7	39.9
Adelaide															
Ships handled	47	63	70	74	69	65	68	66	60	66	63	74	73	66	62
Total teus	15 955	18 803	20 519	23 351	21 963	20 933	25 982	25 188	22 260	27 975	25 493	32 556	31 326	29 569	28 271
Crane rate	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0	27.9	27.2
Elapsed rate	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8	36.3	34.7
Net rate	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7	37.6	37.2
Fremantle															
Ships handled	143	153	159	161	159	164	166	173	165	158	189	184	201	174	156
Total teus	47 597	51 113	50 791	55 593	51 784	52 092	57 903	64 243	62 922	58 374	68 166	72 672	72 660	65 706	64 819
Crane rate	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6	27.3	26.1
Elapsed rate	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na	na	25.8
Net rate	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0	33.4	35.3

na not available

Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial disputation with the MUA.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

3. For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ATFCC	Australian Transport Freight Commodity Code Classification
BTE	Bureau of Transport Economics
CVP	Continuing Voyage Permit
MUA	Maritime Union of Australia
SITC	Standard International Trade Classification
SVP	Single Voyage Permit
teu	Twenty-foot equivalent unit

DEFINITIONS

Elapsed time—the total time over which the ship is worked, measured from labour aboard to labour ashore.
Elapsed rate—the number of containers or teus moved per elapsed hour.
Net time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.
Net rate—the number of containers or teus moved per net hour.
Crane rate—the number of containers or teus moved per net crane hour.

Issue number 22 of Waterline is due for release late March 2000

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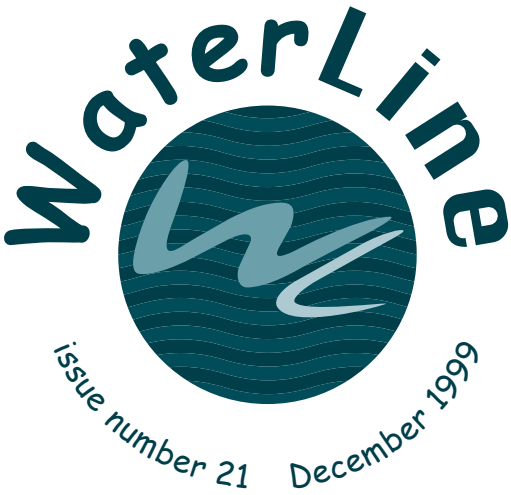

Greetings of the Season and Best Wishes for the Coming Year

ACKNOWLEDGMENTS

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Stevedoring productivity

Table 1 presents the December quarter 1997 to December quarter 1999 indicators of stevedoring productivity at the five major Australian container terminals, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to December quarter 1999 period. The data for Brisbane, Sydney, Melbourne and Fremantle are weighted averages for the major terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal.

bureau of bte transport economics

Overall, while the national crane rate productivity in the December quarter 1999, as measured by the five-port average, exceeded the rate for the December quarter 1998, it was lower than rates achieved for the first three quarters of 1999. On the other hand, the elapsed labour and net ship rates improved slightly when compared with the September quarter 1999, reflecting higher crane intensities (the number of cranes used per ship).

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 19.0 containers per hour for the December quarter compared with 19.6 in the September quarter;
- the five-port average *elapsed labour rate* (productivity *per ship* based on the time labour is aboard the ship) was 23.6 containers per hour for the December quarter compared with 23.1 in the September quarter; and
- the five-port average *net ship rate* (productivity *per ship* while the ship is worked) was 29.0 containers per hour for the December quarter compared with 28.9 in the September quarter.

Crane rates fell by about 2 per cent at Melbourne and by about 8 per cent at Sydney. The fall in the five-port average crane rate productivity for the December quarter 1999 mainly reflects a combination of labour shortages and equipment breakdowns at the P&O terminal at Melbourne and, on the basis of media reports during the December quarter, a combination of a go-slow campaign and continuing equipment damage at the Patrick terminal at Sydney. Terminal productivity in both Sydney and Melbourne was also hampered by congestion resulting from the unusually high volume of container traffic during the lead-up to Christmas. The crane rates at Brisbane, Adelaide and Fremantle improved during the final quarter of 1999 compared with the September quarter 1999.

The *Brisbane* average crane rate was 18.8 containers per hour in the December quarter, up from 18.6 in the September quarter. The Brisbane elapsed labour rate of 20.3 containers per hour and the net ship rate of 25.1 containers per hour were both up on the September

Articles in this issue

quarter figures. The average proportion of elapsed time not worked decreased to approximately 19 per cent.

The *Sydney* average crane rate was 16.6 containers per hour in the December quarter, down from 18.0 in the September quarter. The Sydney elapsed labour rate of 22.5 containers per hour and the net ship rate of 27.6 containers per hour were both down on the September quarter figures. The average proportion of elapsed time not worked decreased to approximately 18 per cent, the lowest recorded in nearly four years.

The *Melbourne* average crane rate was 20.3 containers per hour in the December quarter, down from 20.8 in the September quarter. The Melbourne elapsed labour rate of 25.4 containers per hour and the net ship rate of 30.8 containers per hour were both up on the September quarter figures. The average proportion of elapsed time not worked decreased to approximately 17 per cent.

The *Adelaide* average crane rate was 23.2 containers per hour in the December quarter, up marginally from 23.0 in the September quarter. The Adelaide elapsed labour rate of 30.6 containers per hour and the net ship rate of 33.1 containers per hour were both up on the September quarter figures. The average proportion of elapsed time not worked remained steady at approximately 7 per cent.

The *Fremantle* average crane rate was 21.2 containers per hour in the December quarter, up from 20.7 containers per hour in the September quarter. The elapsed labour rate of 21.7 containers per hour and the net ship rate of 30.7 containers per hour were both up on the September quarter figures. The average proportion of elapsed time not worked increased to approximately 29 per cent.

Container port activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The December quarter 1999 five-port total showed ship visits decreased by 7 per cent, while container throughput increased by 8 per cent, compared with the September quarter. Only at Brisbane did container throughput fall below the September quarter 1999 figure. Compared with the December quarter of the previous year, the five-port figure for container ship visits decreased by about 4 per cent, while the five-port figure for container throughput increased by about 15 per cent.

On a port-by-port basis, the December quarter 1999 *container exchange* at:

- Brisbane was down 3 per cent on the September quarter figure, and up 11 per cent compared with the December quarter 1998;
- Sydney was up 15 per cent on the September quarter figure, and up 26 per cent compared with the December quarter 1998;
- Melbourne was up 7 per cent on the September quarter figure, and up 15 per cent compared with the December quarter 1998;
- Adelaide was up 9 per cent on the September quarter figure, and down 1 per cent compared with the December quarter 1998; and
- Fremantle was up 10 per cent on the September quarter figure, and down 5 per cent compared with the December quarter 1998.

TABLE I CONTAINER TERMINAL PERFORMANCE INDICATORS—PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	**Dec-97**	**Mar-98**	**Jun-98**	**Sep-98**	**Dec-98**	**Mar-99**	**Jun-99**	**Sep-99**	**Dec-99**
Five ports									
Ships handled	963	909	845	1020	942	942	958	979	909
Total containers	467 122	421 769	406 938	493 502	477 744	448 224	469 742	506 696	548 504
Crane rate	18.5	18.8	18.7	19.1	18.9	19.9	20.3	19.6	19.0
Elapsed labour rate	20.5	20.0[a]	20.7[a]	20.7[a]	21.9[a]	23.1[a]	24.0[a]	23.1	23.6
Net ship rate	24.3	23.4	24.7	24.2	26.9	28.2	29.0	28.9	29.0
Brisbane									
Ships handled	177	170	168	192	180	176	193	224	208
Total containers	58 014	49 197	58 939	70 200	67 691	61 204	71 008	77 914	75 199
Proportion of 40-foot containers	0.22	0.20	0.26	0.24	0.24	0.23	0.24	0.27	0.26
Crane rate	16.8	18.0	17.3	18.2	16.8	18.3	18.9	18.6	18.8
Elapsed labour rate	16.8	16.4	17.1	18.7	19.6	21.2	21.4	19.5	20.3
Net ship rate	19.6	19.1	20.2	21.9	22.9	24.7	25.9	24.7	25.1
Elapsed time not worked (per cent)	15	14	15	15	14	14	18	21	19
Sydney									
Ships handled	266	238	219	267	230	221	243	259	244
Total containers	157 430	137 600	130 513	160 007	155 063	142 767	154 062	170 684	195 544
Proportion of 40-foot containers	0.28	0.28	0.29	0.31	0.31	0.31	0.32	0.33	0.33
Crane rate	18.4	17.5	16.9	16.5	15.7	17.7	18.2	18.0	16.6
Elapsed labour rate	21.9	19.9	20.2	19.2	18.9	22.6	22.2	23.1	22.5
Net ship rate	27.7	25.7	26.2	24.2	24.6	29.5	28.7	29.4	27.6
Elapsed time not worked (per cent)	21	23	23	21	23	24	24	21	18
Melbourne									
Ships handled	281	276	234	309	274	271	282	278	266
Total containers	178 302	166 284	147 122	187 696	170 056	161 894	167 942	183 058	195 723
Proportion of 40-foot containers	0.25	0.25	0.26	0.29	0.29	0.28	0.28	0.32	0.31
Crane rate	18.8	19.5	19.2	20.2	21.5	21.5	21.8	20.8	20.3
Elapsed labour rate	19.9	20.1	21.0	21.8	24.3	23.6	25.8	24.5	25.4
Net ship rate	22.6	22.7	24.2	24.5	30.7	28.8	31.0	30.2	30.8
Elapsed time not worked (per cent)	12	12	13	11	21	18	17	19	17
Adelaide									
Ships handled	66	60	66	63	74	73	66	62	62
Total containers	20 773	18 163	23 293	21 444	26 319	24 221	24 445	23 969	26 090
Proportion of 40-foot containers	0.21	0.23	0.20	0.19	0.24	0.29	0.21	0.18	0.17
Crane rate	21.4	22.5	23.1	23.2	23.2	23.2	23.1	23.0	23.2
Elapsed labour rate	29.2	29.6	30.4	29.0	29.3	28.5	30.0	29.4	30.6
Net ship rate	30.1	30.7	31.5	30.3	30.4	30.7	31.1	31.5	33.1
Elapsed time not worked (per cent)	3	4	3	4	4	7	4	7	7
Fremantle									
Ships handled	173	165	158	189	184	201	174	156	129
Total containers	52 603	50 525	47 071	54 155	58 615	58 138	52 285	51 071	55 948
Proportion of 40-foot containers	0.22	0.25	0.24	0.26	0.24	0.25	0.26	0.27	0.28
Crane rate	18.9	19.6	21.5	22.2	20.7	21.4	21.7	20.7	21.2
Elapsed labour rate	18.9	na	na	na	na	na	na	20.4	21.7
Net ship rate	23.2	21.1	23.9	23.8	25.5	25.6	26.6	28.0	30.7
Elapsed time not worked (per cent)	18	na	na	na	na	na	na	27	29

na not available

a. Four-port average only as Fremantle elapsed rate data are not available .

Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial dispute with the MUA.

2. The data in this table are expressed in containers per hour and therefore are not directly comparable with the teus per hour data in table 12.

3. Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.

Sources Patrick, P&O Ports and Sea-Land.

CONTAINER TERMINALS' PRODUCTIVITY

FIGURE 1 FIVE MAJOR PORTS

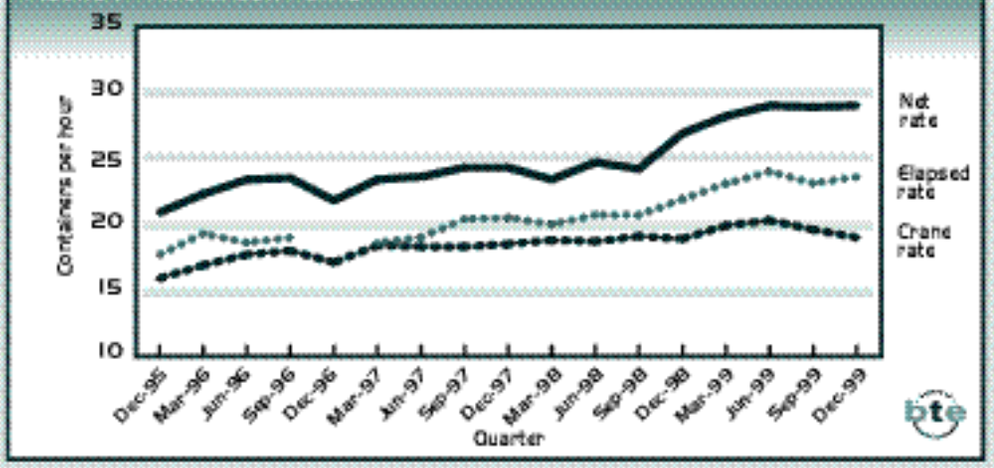


FIGURE 2 BRISBANE

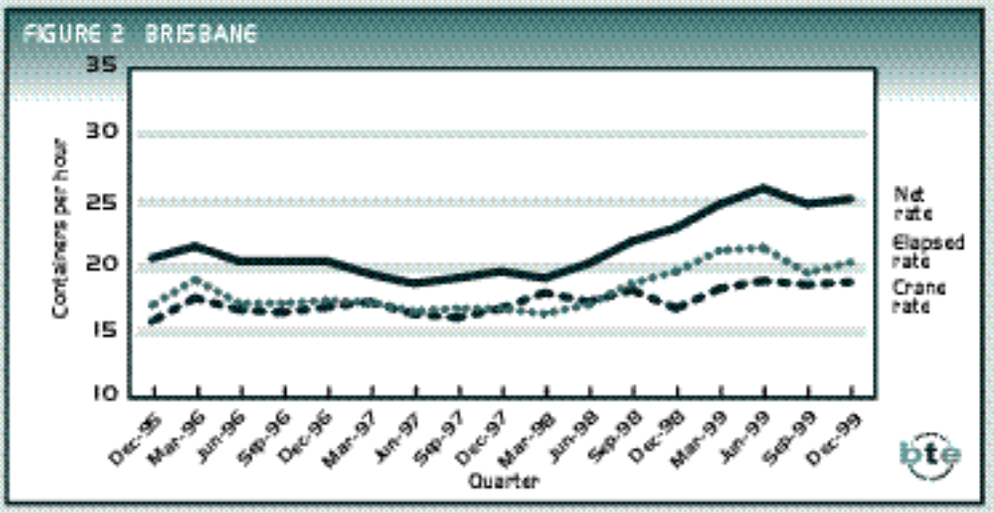
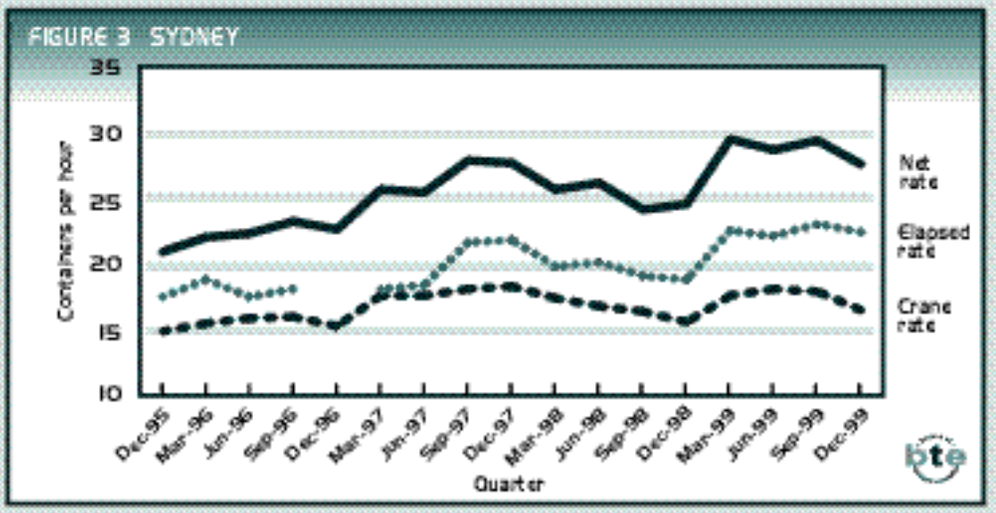


FIGURE 3 SYDNEY



Note These figures are based on the data contained in table 1. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

CONTAINER TERMINALS' PRODUCTIVITY

FIGURE 4 MELBOURNE

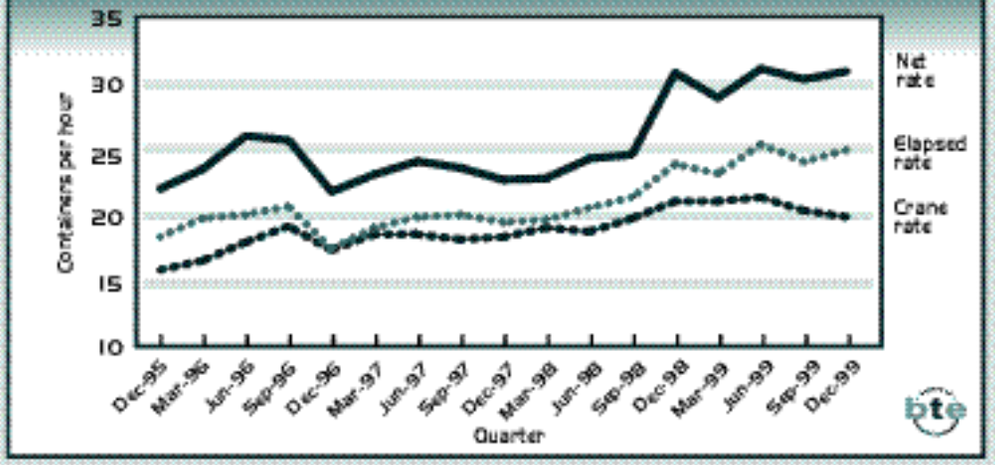


FIGURE 5 ADELAIDE

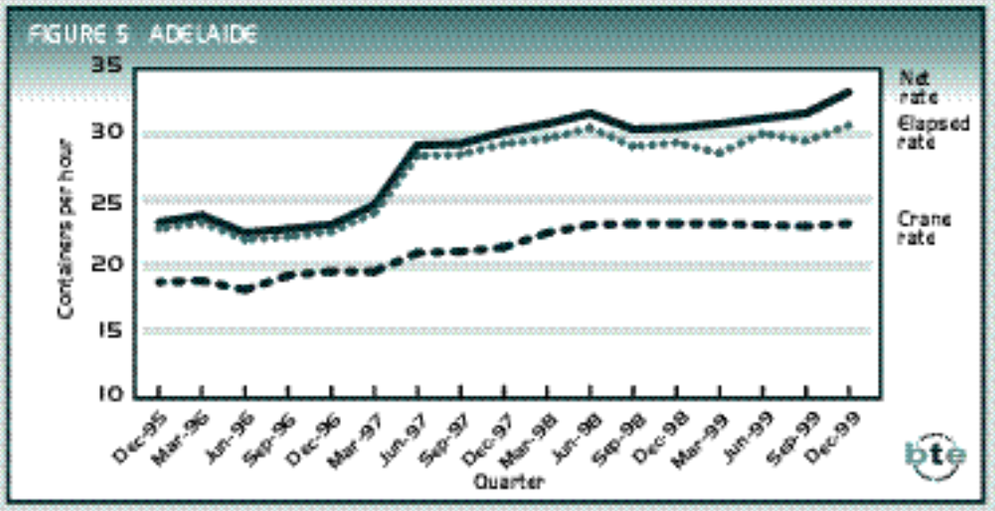
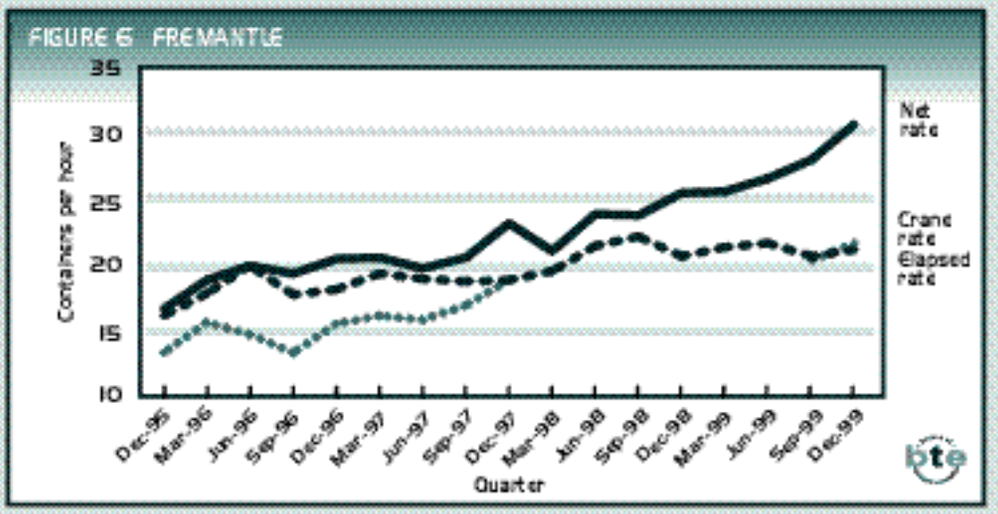


FIGURE 6 FREMANTLE



Note These figures are based on the data contained in table I. Readers should refer to the notes in that table.

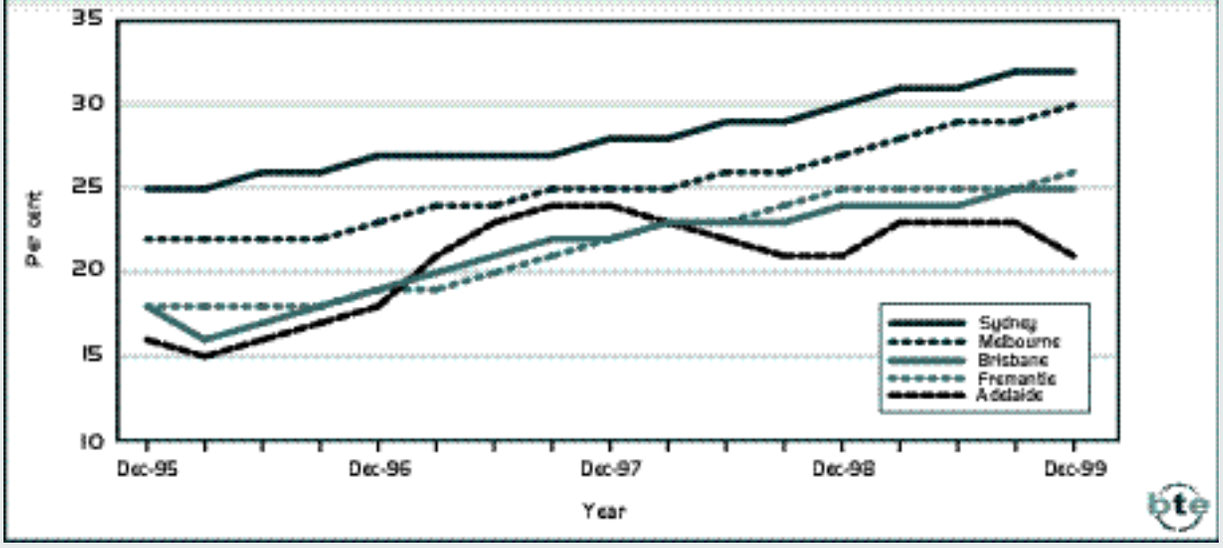
Sources Patrick, P&O Ports and Sea-Land.

Proportion of 40-foot containers

In this issue of *Waterline*, table 1 includes the proportion of 40-foot containers exchanged at each of the five container ports. When compared with the December quarter 1995 (which was the first quarter stevedoring productivity was presented in *Waterline* based on container lifts) the proportion of 40-foot containers has increased at all ports.

Figure 7 shows that the two major ports have tended to each exchange a higher proportion of 40-foot containers than the individual three smaller ports; in addition, the proportion at Sydney always exceeded that at Melbourne in any quarter. Overall, on a five-port-average basis, the proportion of 40-foot containers has increased from 22 per cent in the December quarter 1995, to 30 per cent in the December quarter 1999.

FIGURE 7 PROPORTION OF 40-FOOT CONTAINERS, DECEMBER 1995–1999



Sources Patrick, P&O Ports and Sea-Land.

Teus per hour

Table 12 on page 23 presents the stevedoring productivity indicators in terms of *teus per hour*. These data are retained in *Waterline* for the purpose of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. They cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the December quarter 1999. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

The sample for the December quarter 1999 covers 273 ship calls, equivalent to 30 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 23 per cent at Brisbane to 44 per cent at Adelaide. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 88 per cent in the December quarter 1999. This was down from the figure of 93 per cent that was recorded in the September quarter 1999. The decline in berth availability mainly reflected performance problems and associated congestion at several container terminals.

Caution should be used in undertaking inter-port comparisons of the berth availability data, as there is significant variation between ports in sample sizes and ship call patterns. Figure 8 provides information on berth availability over the period since the March quarter 1997.

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 21 hours in the December quarter 1999. This was similar to the figure of 22 hours that was recorded in the previous quarter. The average waiting times in these quarters were

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, DECEMBER QUARTER 1999

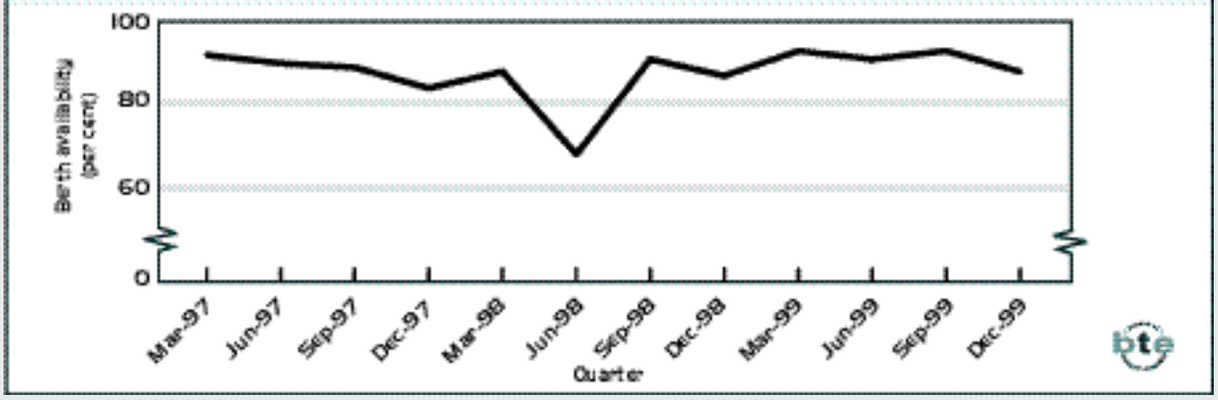
(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5-10	11-20	>20	Total no. of ship calls
Brisbane									
Berth availability	37	2	0	1	2	1	2	2	47
Pilotage	47	0	0	0	0	0	0	0	47
Towage	47	0	0	0	0	0	0	0	47
Sydney									
Berth availability	65	1	2	0	1	1	7	7	84
Pilotage	84	0	0	0	0	0	0	0	84
Towage	84	0	0	0	0	0	0	0	84
Melbourne									
Berth availability	70	0	1	1	0	2	2	4	80
Pilotage	80	0	0	0	0	0	0	0	80
Towage	79	0	0	0	0	1	0	0	80
Adelaide									
Berth availability	26	0	0	0	0	0	1	0	27
Pilotage	27	0	0	0	0	0	0	0	27
Towage	27	0	0	0	0	0	0	0	27
Fremantle									
Berth availability	32	0	0	0	0	3	0	0	35
Pilotage	35	0	0	0	0	0	0	0	35
Towage	35	0	0	0	0	0	0	0	35
Five ports									
Berth availability	230	3	3	2	3	7	12	13	273
Pilotage	273	0	0	0	0	0	0	0	273
Towage	272	0	0	0	0	1	0	0	273

Note *Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns.*

Sources *Data for a sample of ship calls provided by shipping lines.*

FIGURE 8 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997–1999



Sources Data for a sample of ship calls provided by shipping lines.

well above the figures of 11 hours and 14 hours that were recorded in the first two quarters of 1999.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportions were 100 per cent for pilotage and virtually 100 per cent for towage in the December quarter 1999. The data presented in table 2 indicate that these services were provided within one hour of the confirmed time in all but one of the surveyed cases.

The towage indicator shows the extent to which towage services were available at the confirmed ship movement time specified in the tug booking. It therefore does not reflect the effects of industrial action in the towage sector during the December quarter 1999, as tugs could not be booked to provide services during these periods.

Other waiting time

The six shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

In the December quarter 1999, 54 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. The corresponding proportion in the September quarter 1999 was 52 per cent. The average duration of other waiting time incidents was 11 hours per incident in the December quarter 1999, compared with 8 hours per incident in the previous quarter.

Table 3 summarises the data on other waiting time incidents in the December quarter 1999. The shipping lines identified a total of 209 incidents (affecting 148 ship calls) for the sample of ship calls over this period. These incidents involved both ship-related and waterfront factors.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The data

provided by shipping lines indicate that four incident types accounted for around two-thirds of the total hours attributed to other ship waiting time in the December quarter 1999:

- Awaiting stevedoring labour (33 per cent);
- Port closed due to public holidays (14 per cent);
- Late ship arrival (12 per cent);
- Completion of stevedoring earlier than forecast (9 per cent).

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, DECEMBER QUARTER 1999

(Number of incidents)

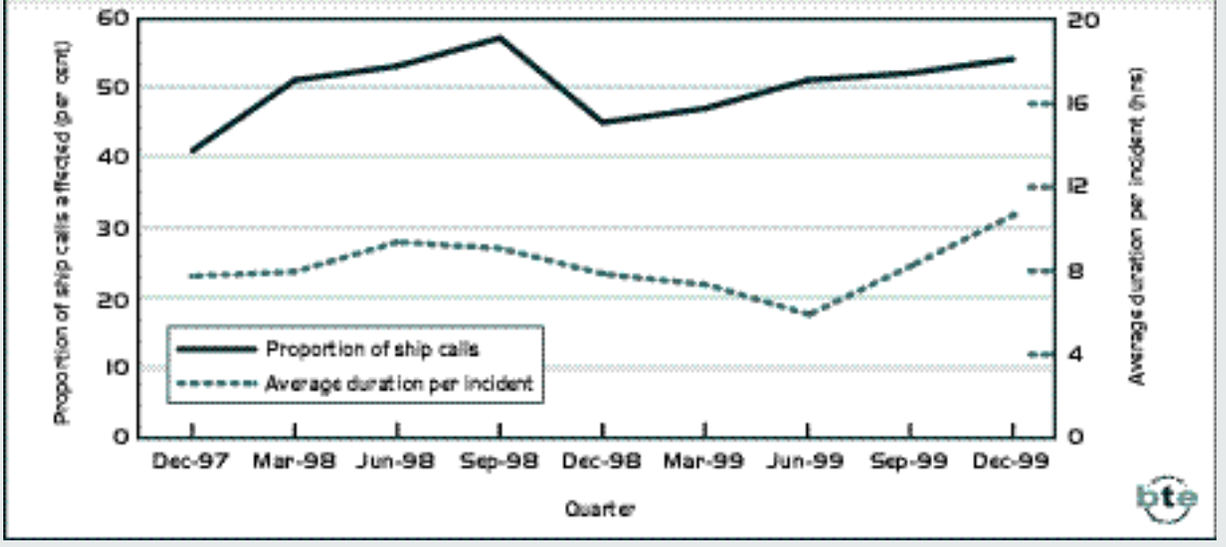
Incident type	Ship waiting time (hrs) 1	2	3	4	5-10	11-20	>20	Total no. of incidents
Awaiting labour	11	16	8	5	22	6	7	75
Stevedoring finished early	11	18	11	5	7	0	0	52
Pilot/tug booking not at preferred time	3	5	3	2	1	2	0	16
Early ship arrival	0	1	4	0	4	2	0	11
Crane breakdown	3	3	3	0	0	1	0	10
Ship repairs or maintenance	1	1	1	2	1	2	2	10
Late ship arrival	0	1	0	0	1	1	1	4
Industrial action	0	0	0	0	3	1	0	4
Stevedoring finished late	0	0	0	0	1	1	0	2
Weather or tides	1	2	0	1	2	0	0	6
Other	3	1	2	0	3	1	9	19
Total incidents	**33**	**48**	**32**	**15**	**45**	**17**	**19**	**209[a]**

a. These incidents affected 148 of the 273 ship calls covered in table 2.

Sources Data for a sample of ship calls provided by shipping lines.

Figure 9 provides information on other ship waiting time over the period since the December quarter 1997. It indicates the proportion of ship calls affected and the average duration per incident in each quarter.

FIGURE 9 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, 1997–1999



Sources Data for a sample of ship calls provided by shipping lines.

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals—stevedoring rate and cargo receival. Data are not available for Adelaide.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. Compared with the previous

quarter, the stevedoring rate indicator increased at Brisbane and Sydney, and was unchanged at Melbourne.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial measure of one factor that can affect container terminal performance. Compared with the previous quarter, the cargo receival indicator increased at Sydney. It did not change significantly at the other two ports for which complete data are available.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation *at 24 hours prior to actual arrival*. Compared with the previous quarter, this indicator declined at Brisbane and Sydney. It did not change significantly at the other two ports for which data are available.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival.* There was little change in this indicator at the four ports for which data are available.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, SEPTEMBER AND DECEMBER QUARTERS 1999

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	**Jul–Sep**	**Oct–Dec**	**Jul–Sep**	**Oct–Dec**	**Jul–Sep**	**Oct–Dec**	**Jul–Sep**	**Oct–Dec**	**Jul–Sep**	**Oct–Dec**
Stevedoring										
Stevedoring rate	44	50	48	62	46	46	na	na	na	38
Cargo receival	91	91	77	82	96	94	na	na	na	97
Ship arrival										
Advice at 24 hrs	63	52	53	46	na	na	59	57	52	54
Advice inside 24 hrs	93	93	93	94	na	na	93	90	90	88

na not available

Sources AAPMA, Patrick and P&O Ports.

PORT INTERFACE COST INDEX

The Port Interface Cost Index provides a measure of shore-based shipping costs (charges) for containers moved through the Australian mainland capital city ports. Data for the periods January–June 1999 and July–December 1999 are presented in tables 5 to 7. 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. The indicative approach was adopted because of the difficulty in obtaining data on the multitude of factors affecting the prices charged by each service provider, particularly for towage and road transport charges, and customs brokers' fees.

Port and related charges

Table 5 provides the parameters used to determine the port and related charges in table 6. These parameters relate to a representative port call by a container ship (Lloyd's ship classification UCC). The representative ship was selected from the ship-size range with the most port calls by UCC-type ships during the six months. The ship-size range of 15 000 to 20 000 GRT has had the most port calls at each port since monitoring of port charges commenced in 1992. The other cost parameters are then determined by taking the mean of all port calls in the range that contains the representative ship.

TABLE 5 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1999

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
Teus exchanged[a]										
Total	399	443	772	930	888	1080	560	619	394	400
Loaded	310	353	621	769	742[r]	908	433	493	312	327
Empty	89	90	151	161	146[r]	172	127	126	82	73
Loaded inwards	132	171	393	492	388[r]	492	175	191	156	179
Loaded outwards	178	182	228	277	354[r]	416	257	302	156	148
Ship call parameters[a]										
Number of port calls	4	4	3	3	4	4	10	6	10	7
Elapsed berth time (hrs)	24	24	40	48	38	42	20	22	21	21

r revised
a. Mean value for ships between 15 000 and 20 000 GRT.
Sources BTE estimates based on ship call data supplied by relevant port authorities/corporations and other port service providers.

It is important to directly connect the mean number of teus exchanged per port call with the size of the representative ship. This is because most port and related charges, particularly towage and port authority tonnage charges, depend on the size of the ship. However, shipping economics are such that, the larger the ship being used to transport the cargo, the more ship operators attempt to exchange higher volumes of cargo per port call. As a result, the per unit (in this case teu) cost of exchanging cargo at a particular port remains roughly the same for each port call regardless of the size of the ship. It is for this reason that comparative port charge analyses that keep the cargo exchange constant while varying the ship size are misleading. A discussion of this, in relation to the Port Interface Cost Index, can be found in *Waterline 4*, October 1995, pp. 9–13. That article also demonstrates

TABLE 6 PORT AND RELATED CHARGES, 1999

Indicator	Brisbane Jan–Jun	Brisbane Jul–Dec	Sydney Jan–Jun	Sydney Jul–Dec	Melbourne Jan–Jun	Melbourne Jul–Dec	Adelaide Jan–Jun	Adelaide Jul–Dec	Fremantle Jan–Jun	Fremantle Jul–Dec
Ship-based charges ($/teu)										
Conservancy	5.70	5.13	-	-	-	-	1.53	1.39	1.01	-
Tonnage	-	-	8.69	7.22	5.90	4.16	7.26	6.84	6.42	6.33
Pilotage	12.86	11.57	4.07	3.38	6.18	5.08	4.20	3.79	5.30	5.23
Towage	19.03	17.12	9.49	7.88	7.75	6.37	21.98	19.86	12.48	12.31
Mooring, unmooring	4.29	3.86	4.08	3.38	1.06	0.87	-	-	2.79	2.75
Berth hire[a]	-	-	-	-	10.18	9.41	-	-	-	-
Total[b]	41.87	37.68	26.33	21.86	31.07	25.89	34.97	31.88	27.99	26.62
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	33.00	25.90	53.00	53.00	47.30	47.30
Exports	26.00	26.00	45.00	45.00	33.00	25.90	53.00	53.00	47.30	47.30
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	13.90	13.90
Total port and related charges ($/teu)[b]										
Loaded imports	110	106	86	82	64	52	88	85	89	88
Loaded exports	110	106	71	67	64	52	88	85	89	88
Charges per ship visit ($/visit)										
Total ship-based charges	16702	16702	20334	20334	27576	27959	19574	19745	11039	10641
Empty teus[c]	1268	1283	0	0	584[r]	0	0	0	631	562

- not applicable
r revised
a. Charged by stevedores and itemised separately from basic stevedoring charge.
b. Components may not sum to totals due to rounding.
c. 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 5.

Sources BTE 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.

that the BTE's Port Interface Cost Index is a reasonable approximation of port interface costs for most container movements across the Australian mainland capital city ports.

Table 6 provides the port and related charges at the five mainland capital city ports for the periods January–June 1999 and July–December 1999. Port and related charges comprise ship-based charges and cargo-based charges.

Ship-based charges

Compared with the January–June 1999 period, the only actual changes to ship-based charges in July–December 1999 were:

- the elimination of conservancy dues at Fremantle;
- a 14 per cent decrease in tonnage charges at Melbourne;
- a 22 per cent decrease, per loaded teu, in wharfage charges at Melbourne; and
- the elimination of the wharfage charge on empty containers at Melbourne.

However, changes in the parameters on which ship-based charges are calculated can also cause significant fluctuations in the cost per teu or the cost per ship visit. The greatest parameter-based changes in July–December 1999 resulted from the fall in charges per teu as a consequence of the increase in the average number of teus exchanged per ship at all five ports. On a *per teu basis*, the overall changes in ship-based charges in July–December 1999 were:

- at *Brisbane*, a 10 per cent fall in ship-based charges per teu—resulting from an 11 per cent increase in the average teu-exchange;
- at *Sydney*, a 17 per cent fall in ship-based charges per teu—resulting from a 20 per cent increase in the teu-exchange;
- at *Melbourne*, a 17 per cent fall in ship-based charges per teu—resulting from a 14 per cent decrease in tonnage charges and a 22 per cent increase in average teu-exchange;
- at *Adelaide*, a 9 per cent fall in ship-based charges per teu—resulting from an 11 per cent increase in the average teu-exchange; and
- at *Fremantle*, a 5 per cent fall in ship-based charges per teu—resulting from the elimination of conservancy dues and a 1 per cent increase in average teu-exchange.

Countering the fall in costs per teu, the *per ship-visit charge* rose in Melbourne and Adelaide as a result of 12 per cent increases in the elapsed berth time. Changes in the elapsed berth time affect the berth hire charge in Melbourne and the tonnage charge in Adelaide.

While caution should always be used when making inter-port comparisons on a per teu basis, Sydney remains the lowest cost port for ship-based charges. This is significant from a cargo owner's point of view. From the point of view of ship operators using ships similar to the representative ship in table 5, Fremantle remains the lowest cost port for ship-based charges on a per ship-visit basis.

Cargo-based charges

Apart from at Melbourne, where wharfage for a loaded teu fell from $33.00 to $25.90 per unit, and for an empty teu fell from $4 per unit to zero, there were no changes in port and related cargo-based charges in July–December 1999. However, it should be noted that charges such as those on empty containers are not included in the Port Interface Cost Index because such charges are borne by the ship operator rather than the cargo owner. Nevertheless, the empty container charges are reported in table 6 as a charge per ship visit for the sake of completeness.

Changes in total port and related charges per loaded teu

Total port and related charges per loaded teu, for the period July–December 1999:

- at *Brisbane*, fell by about 4 per cent, solely due to the 10 per cent decrease in the ship-based component;
- at *Sydney*, fell by about 5 per cent for imports and 6 per cent for exports, solely due to the 17 per cent decrease in the ship-based component;
- at *Melbourne*, fell by about 19 per cent, due to the 22 per cent decrease in wharfage charges and the 17 per cent decrease in the ship-based component;
- at *Adelaide*, fell by about 4 per cent, solely due to the 9 per cent decrease in the ship-based component; and
- at *Fremantle*, fell by about 2 per cent, solely due to the 5 per cent decrease in the ship-based component.

TABLE 7 PORT INTERFACE COSTS, 1999

($/teu)

Indicator	Brisbane Jan–Jun	Brisbane Jul–Dec	Sydney Jan–Jun	Sydney Jul–Dec	Melbourne Jan–Jun	Melbourne Jul–Dec	Adelaide Jan–Jun	Adelaide Jul–Dec	Fremantle Jan–Jun	Fremantle Jul–Dec
Imports										
Ship-based charges	42	38	26	22	31	26	35	32	28	27
Cargo-based charges	68	68	60	60	33	26	53	53	61	61
Stevedoring	181[r]	181[p]	181[r]	181[p]	181[r]	181[p]	181[r]	181[p]	181[r]	181[p]
Customs brokers' fees	123	123	152	152	138	138	132	132	141	141
Road transport charges	185	185	289	293	251	252	168	169	199	199
Total imports[a]	600[r]	596	707[r]	707	634[r]	623	569[r]	566	610[r]	609
Exports										
Ship-based charges	42	38	26	22	31	26	35	32	28	27
Cargo-based charges	68	68	45	45	33	26	53	53	61	61
Stevedoring	181[r]	181[p]	181[r]	181[p]	181[r]	181[p]	181[r]	181[p]	181[r]	181[p]
Customs brokers' fees	77	77	111	111	89	89	73	73	69	67
Road transport charges	185	185	289	293	251	252	168	169	199	199
Total exports[a]	553[r]	549	651[r]	651	585[r]	574	511[r]	508	538[r]	535

p provisional pending updating of the ACCC stevedoring charge.
r revised
a. Components may not sum to totals due to rounding.

Notes
1. Based on parameters described in table 5.
2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.
3. The stevedoring charge used in Waterline is a weighted average for several major Australian ports. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTE 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; and stevedoring charges data supplied by the ACCC.

Stevedoring charges per teu

At the beginning of 1999 the Australian Competition and Consumer Commission (ACCC) resumed monitoring the prices, costs and profits of container stevedoring companies at the major Australian container ports. Its findings can be found in the ACCC *Container Stevedoring Monitoring Report*, October 1999.

Estimates provided by the ACCC indicate that the national weighted average revenue per teu for its sample of significant container terminal operations (Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie) was $181 for the February–June 1999 period. As a result, appropriate revisions have been made to the January–June 1999 port interface cost index figures as published in *Waterline 20*. As the stevedoring charges for the July–December 1999 period have not been released, a provisional cost of $181 per teu has been used in this issue of *Waterline*.

Land-based charges per teu

The average charges for customs brokers' fees and road transport charges for the January–June and July–December 1999 Port Interface Cost Index are included in table 7. These charges are based on data provided by approximately 40 customs brokers and 50 road transport operators. Customs brokers' fees for imports are higher than fees for exports, reflecting the more complex clearance procedures for import containers.

During the July–December 1999 period there was a one per cent rise in both import and export aggregate average customs brokers' fees at Melbourne, and a fall of 3 per cent in export fees at Fremantle. Any minor changes in customs brokers' fees at Brisbane, Sydney or Adelaide amounted to less than half of one per cent.

Apart from a one per cent rise in Sydney, there were no other changes in average road transport charges during July–December 1999. One of the parameters used to estimate road transport charges is the time taken to move containers from/to the wharf to/from the customer's warehouse. Both distance and traffic congestion impact on this parameter and, to some extent, help explain the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

In *Waterline 18*, the BTE reported that it had received numerous comments from road transport operators in Sydney about increasing congestion and terminal delays. Although most operators surveyed since then have reported that the situation has improved, there is still anecdotal evidence of occasionally significant delays from both traffic congestion and service delays at stevedoring terminals and empty container parks. Consequently, it is likely that road transport charges in Sydney will be more variable than at other ports.

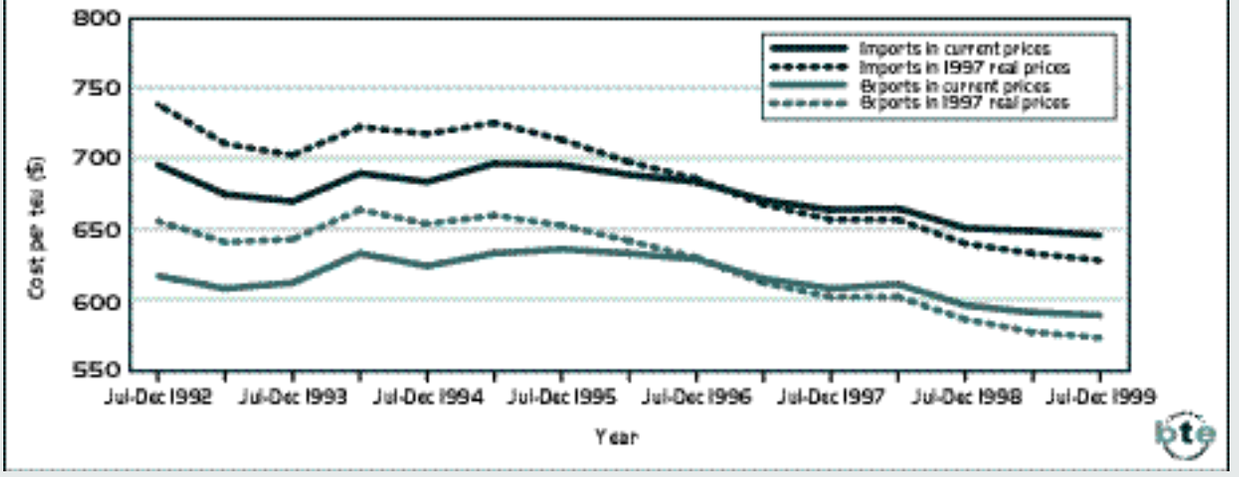
Indices for individual ports

Table 7 indicates that, between January–June and July–December 1999, there were falls in total port interface costs ranging from 0.03 per cent to 1.82 per cent across the five ports. However, this should be interpreted with caution given the provisional nature of the reported stevedoring charges. Even if stevedoring charges did not change during the July–December 1999 period, care should also be taken in making inter-port comparisons of port interface costs. The use of a single stevedoring charge for all ports reflects the scope of the available information which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

National index

Figure 10 provides the National Port Interface Cost Index back to 1992. In overall terms, there was little movement in the national index between the January–June and July–December 1999 periods. In fact, in current prices, national import charges decreased by 0.5 per cent to $646 per teu, while export charges decreased by 0.4 per cent to $589 per teu in July–December 1999.

FIGURE 10 NATIONAL PORT INTERFACE COST INDEX



Sources BTE 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 supplied by the ACCC; and ABS gross non-farm product deflator data (cat. no. 5206.0).

PORT PERFORMANCE—NON-FINANCIAL

The 1999 non-financial indicators for the five mainland capital city ports are presented in table 8.

Cargo throughput

Total cargo throughput at the five ports was 48.7 million tonnes for July–December 1999, compared with 47.8 million tonnes for the January–June 1999 period. Total cargo throughput increased at Brisbane (5 per cent), Sydney (10 per cent) and Melbourne (3 per cent). It declined at Adelaide (1 per cent) and Fremantle (9 per cent). Overall, this resulted in an increase of 2 per cent in total throughput for the five ports compared with the previous half year, and an increase of 4 per cent compared with July–December 1998.

Non-containerised general cargo throughput at the five ports was 2.58 million tonnes for July–December 1999, compared with 2.37 million tonnes for January–June 1999. This was the outcome of increases at Brisbane (16 per cent), Sydney (12 per cent), Melbourne (6 per cent) and Adelaide (29 per cent); and a small decline at Fremantle (1 per cent). Overall, this resulted in an increase of 9 per cent in non-containerised general cargo throughput for the five ports compared with the previous half year, and an increase of 7 per cent compared with July–December 1998.

Total container traffic throughput for the five ports was 1.57 million teus for July–December 1999, compared with 1.36 million teus for January–June 1999. This represents an increase of 15 per cent. Throughput of loaded teus increased by 17 per cent, with loaded imports increasing by 23 per cent and loaded exports increasing by 11 per cent. Loaded containers increased at Brisbane (15 per cent), Sydney (25 per cent), Melbourne (18 per cent) and Fremantle (3 per cent); and decreased at Adelaide (6 per cent).

TABLE 8 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1999

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five ports[d]	
Indicator	**Jan-Jun**	**Jul-Dec**	**Jan-Jun**	**Jul-Dec**	**Jan-Jun**	**Jul-Dec**	**Jan-Jun**	**Jul-Dec**	**Jan-Jun**	**Jul-Dec**	**Jan-Jun**	**Jul-Dec**
Total cargo throughput ('000 tonnes)	10 663	11 190	11 447	12 543	10 774	11 120	3 129	3 112	11 762	10 698	47 775	48 663
Non-containerised general cargo ('000 tonnes)[a]	520	605	336	375	1 036	1 093	130	167	347	342	2 368	2 583
Containerised cargo (teus exchanged)												
Full import	61 411	80 820	218 094	275 821	241 834	295 480	19 280	17 378	53 309	60 132	593 928	729 631
Empty import	28 334	27 606	13 006	11 319	38 766	42 995	8 552	6 877	14 230	11 960	102 888	100 757
Full export	82 911	85 819	126 359	155 479	220 387	249 443	28 271	27 505	53 159	49 716	511 087	567 962
Empty export	12 881	14 652	70 565	78 921	52 431	60 374	5 384	4 594	13 607	12 480	154 868	171 021
TOTAL	185 537	208 897	428 024	521 540	553 418	648 292	61 487	56 354	134 305	134 288	1 362 7711	569 371
Average total employment[b]	211	220	189	189	78	80	162	156	169	167	808	812
Port turnaround time (hrs)[c]												
Median result	33	32	38	43	36	43	18	21	23	25	-	-
95th percentile	65	60	66	84	67	85	26	43	44	50	-	-

- not applicable
na not available
a. Excludes bulk cargoes.
b. Comparisons between ports are not appropriate since each port authority/corporation has a different structure.
c. Port turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate since each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.
d. Components may not sum to totals due to rounding.

Source AAPMA.

Compared with 1998, the annual 1999 five-port total container traffic, measured in teus, increased by 14 per cent.

Employment

Table 8 indicates that *average employment* at the five mainland capital city port authorities/corporations rose by 0.5 per cent in the July–December 1999 period compared with the previous half-year. It declined by 15 per cent compared with July–December 1996, the earliest comparable period since BTE monitoring commenced. Prior to this period, major reforms throughout the Australian port authority sector were at various stages at each of the ports.

PORT PERFORMANCE—FINANCIAL

Financial performance indicators for the five mainland capital city port authorities/corporations during 1997–98 and 1998–99 are presented in table 9.

Earnings and assets, 1998–99

Earnings before interest and tax (EBIT) rose at Port of Brisbane Corporation (51 per cent), Sydney Ports Corporation (13 per cent), and Melbourne Port Corporation (14 per cent). It fell at Ports Corp South Australia (33 per cent), and Fremantle Port Authority (12 per cent).

Operating profit after income tax rose by 48 per cent at Brisbane, by 27 per cent at Sydney, and by 27 per cent at Melbourne. It fell by 49 per cent at South Australia and by 33 per cent at Fremantle.

Average total assets in service rose at Brisbane (5 per cent), Sydney (25 per cent), Melbourne (3 per cent) and Fremantle (4 per cent). At South Australia they fell by 3 per cent.

Return on assets (EBIT as a proportion of total assets) rose at Brisbane (45 per cent), and at Melbourne (11 per cent). It fell at Sydney (10 per cent), at South Australia (31 per cent) and at Fremantle (15 per cent).

Dividends, 1998–99

A special dividend of $26 million at Melbourne Port Corporation in 1998–99, and a capital dividend of $11.6 million at Ports Corp South Australia in 1997–98 were excluded from the calculations.

Dividends paid rose at Brisbane (231 per cent), Sydney (7 per cent), Melbourne (1 per cent), and South Australia (17 per cent); but fell at Fremantle (33 per cent).

TABLE 9 FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORT AUTHORITIES/CORPORATIONS,

($/teu)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	1997–98	1998–99	1997–98	1998–99	1997–98	1998–99	1997–98	1998–99	1997–98	1998–99
					per cent					
Return on assets[a]	6.3	9.2	12.5	11.3	8.1	9.0	24.5	17.0	20.0	17.01
Dividend payout ratio[b]	25.9	57.9	50.0	42.2	41.7	33.3	23.9	54.9	10.0	10.00
Debt/equity[c]	0.1	0.0	44.4	42.1	25.6	26.0	63.7	48.6	64.9	38.80
					$ million					
EBIT[d]	27.2	41.2	54.6	61.8	41.3	47.2	25.8	17.4	22.0	19.4
Ave. total assets in service	429.2	448.8	435.9	545.9	507.7	523.0	105.4	102.4	109.9	113.8
Dividends paid	4.8	15.8	12.7	13.6	8.0	8.1[e]	4.7[f]	5.5	1.3	0.8
Operating profit[d]	18.5	27.3	25.5	32.3	19.2	24.2	19.6	10.0	12.6	8.4
Total debt	0.3	0.2	150.5	150.7	102.5	99.9	35.0	28.9	33.5	25.2
Total equity	409.8	428.2	339.4	358.0	400.3	383.8	55.0	59.5	51.6	64.9

a. EBIT (earnings before interest and tax) as a proportion of total assets.
b. Dividends paid out as a proportion of operating profit.
c. Total debt as a proportion of total equity.
d. Includes abnormals.
e. A special dividend of $26 million has been excluded.
f. A capital dividend of $11.6 million has been excluded.

Source AAPMA.

The *dividend payout ratio* (dividends paid out as a proportion of operating profit) rose at Brisbane (124 per cent) and South Australia (129 per cent), and remained steady at Fremantle. It fell at Sydney (16 per cent) and Melbourne (20 per cent).

Debt and equity, 1998–99

Total debt fell by 30 per cent at Brisbane, by 3 per cent at Melbourne, by 17 per cent at South Australia and by 25 per cent at Fremantle. It remained virtually unchanged at Sydney.

Total equity rose by 4 per cent at Brisbane, by 5 per cent at Sydney, by 8 per cent at South Australia, and by 26 per cent at Fremantle. It fell by 4 per cent at Melbourne.

The *debt/equity ratio* fell by 33 per cent at Brisbane, by 5 per cent at Sydney, by 24 per cent at South Australia, and by 40 per cent at Fremantle. It rose by 2 per cent at Melbourne.

CREW TO BERTH RATIOS

This will be the last crew to berth monitoring report in *Waterline*. The BTE's objective in monitoring crew to berth ratios was to help the shipping industry to better understand the costs involved in crewing ships. There is evidence, including that from recent enterprise agreements, that this objective is being achieved. It is therefore considered that there is no need for monitoring to continue. The BTE thanks the Australian Shipowners Association, Australian Metals and Mines Association, the maritime unions and a number of shipping companies for their assistance and cooperation in crew to berth monitoring.

The BTE has monitored crew to berth ratios for Australian merchant and offshore shipping on a quarterly basis. The crew to berth ratio is defined as the number of seafarer days worked over a period of time, divided by the number of berth days operated. Berth days operated is defined as the sum, over the period, of the number of people required each day by the relevant statutory authority and the ship operator to carry out the work of the ship(s) in a safe and efficient manner.

Merchant shipping

Figure 11 presents information on the crew to berth ratio, and its components, for Australian merchant shipping. As the data have not been audited, the December quarter 1999 merchant shipping data in this issue of *Waterline* should be regarded as preliminary. The overall crew to berth ratio for merchant shipping increased to 2.124 in the December quarter 1999, compared with 2.103 in the September quarter, but is lower than the 2.133 figure recorded in the September quarter 1993 when monitoring commenced.

Table 10 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, for the December quarter 1999. Ship time is the largest component of the crew to berth ratio for merchant shipping, and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio rose to 1.046 in the December quarter, compared with 1.034 in the September quarter.

Accrued leave gives effect to leave with pay for weekends and public holidays worked, annual leave with pay of five weeks per annum, sick leave, compassionate leave and leave in lieu of a 35-hour week. The accrued leave ratio increased to 0.975 in the December quarter, compared with 0.962 in the September quarter.

Other components of the merchant shipping crew to berth ratio were:

- compensation leave, which rose to 0.038, compared with 0.036 in the September quarter, representing a rise of 5 per cent compared with the previous quarter, and a fall of about 48 per cent compared with the September quarter 1993 figure when merchant shipping monitoring began;
- long service leave, which fell to 0.035, compared with 0.038 in the September quarter;
- study leave, which fell to 0.022, compared with 0.027 in the September quarter; and
- training and other paid leave, which increased to 0.007, compared with 0.005 in the September quarter.

FIGURE 11 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING

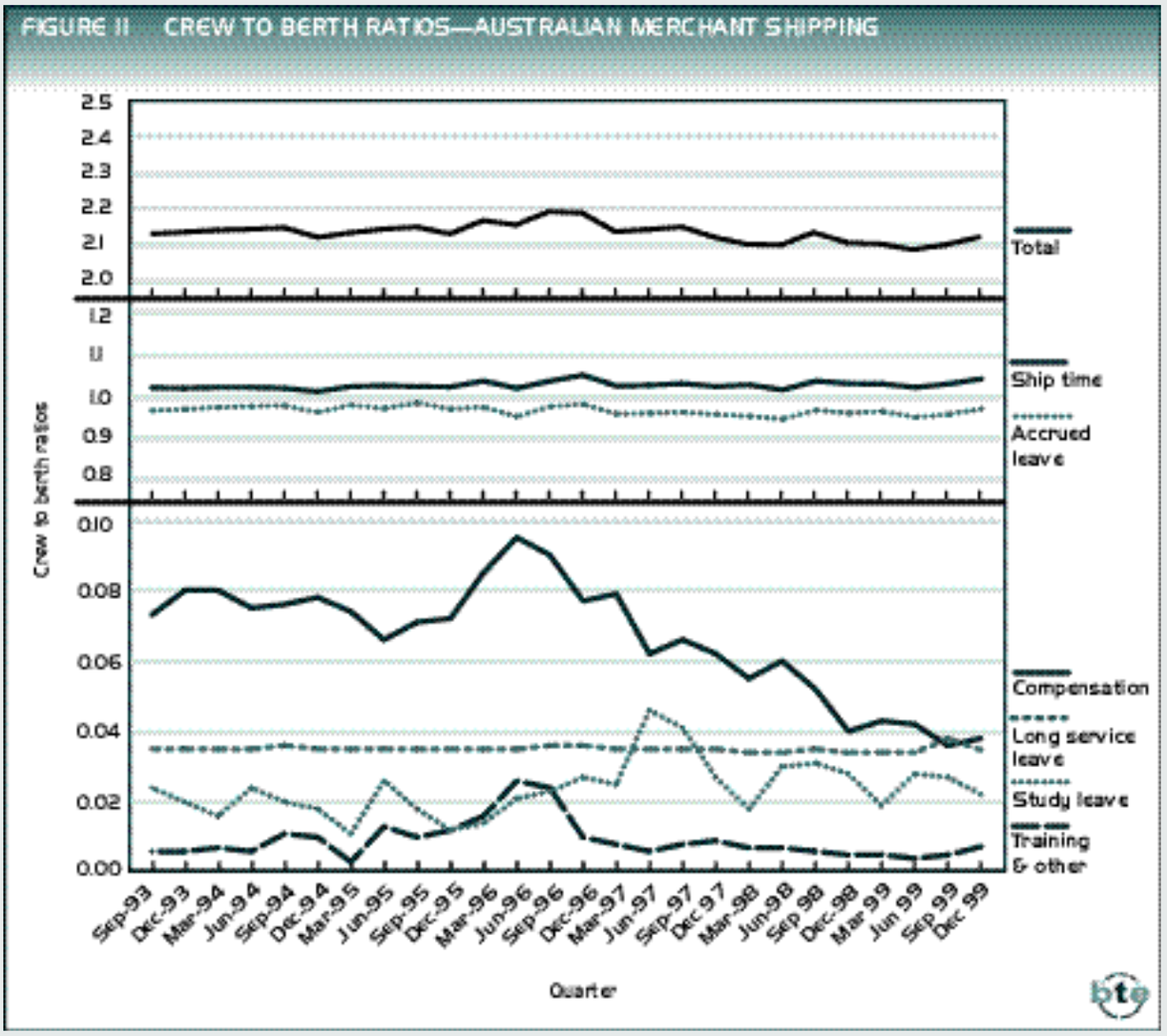


TABLE 10 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1999[p]

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.060	0.986	0.022	0.036	0.050	0.018	2.172
Engineers	1.060	0.985	0.028	0.035	0.038	0.009	2.155
All officers	**1.060**	**0.985**	**0.025**	**0.035**	**0.044**	**0.013**	**2.163**
Integrated ratings	1.030	0.964	0.046	0.034	0.000	0.001	2.075
Catering crew	1.045	0.976	0.064	0.035	0.009	0.005	2.133
All ratings	**1.034**	**0.966**	**0.050**	**0.034**	**0.002**	**0.002**	**2.088**
All crew	**1.046**	**0.975**	**0.038**	**0.035**	**0.022**	**0.007**	**2.124**
Previous quarter	1.034	0.962	0.036	0.038	0.027	0.005	2.103
Initial level [b]	1.025	0.971	0.073	0.035	0.024	0.006	2.133

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for September quarter 1993.
Source Data provided by ship operators.

FIGURE 12 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING

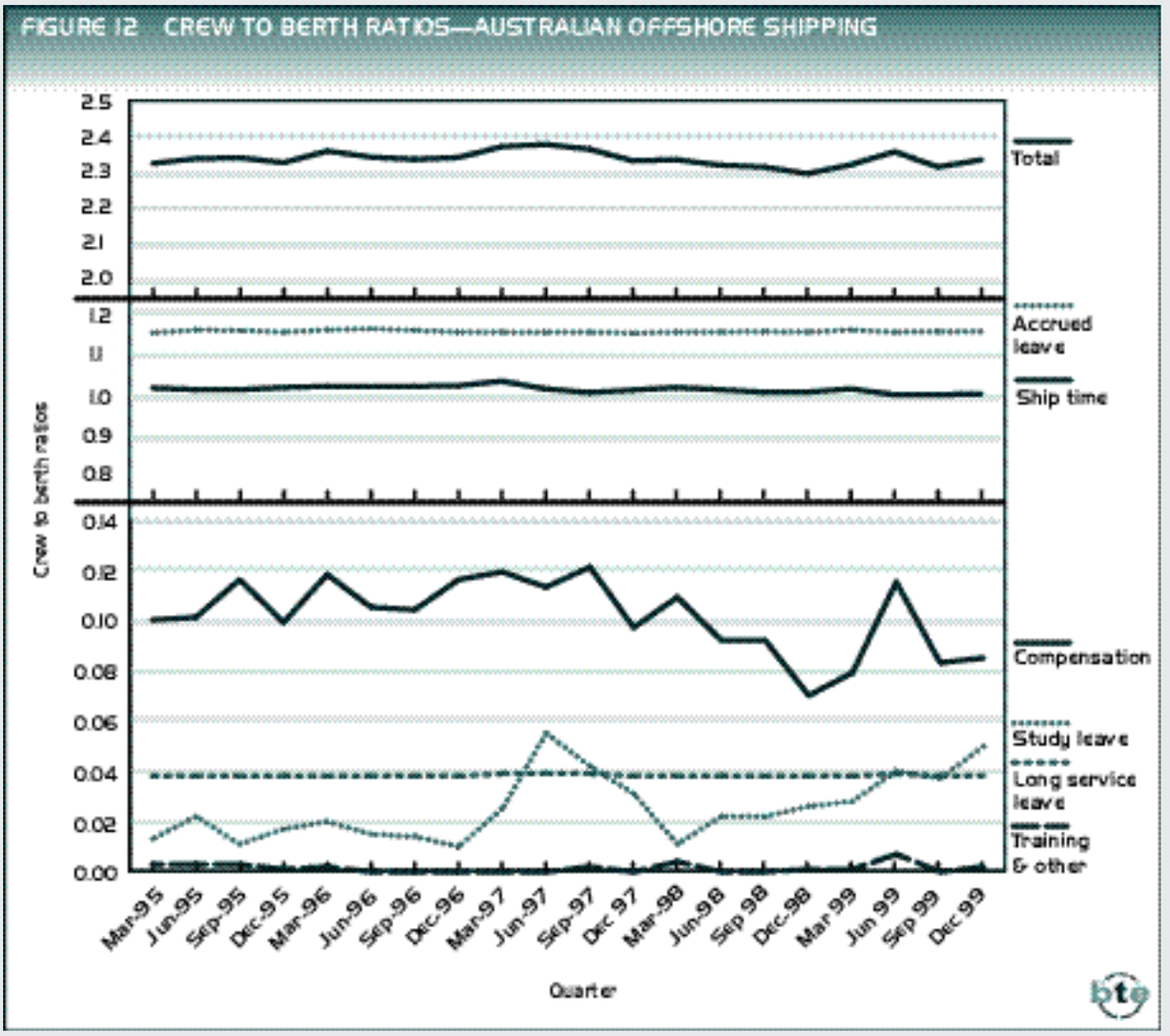


TABLE 11 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, DECEMBER QUARTER 1999p

Crew type	Ship time	Accrued leave	Compen-sation	Long service leave	Study leave	Training & other	Total[a]
Deck officers	1.007	1.153	0.056	0.039	0.109	0.001	2.364
Engineers	1.005	1.153	0.020	0.038	0.082	0.001	2.300
All officers	**1.006**	**1.153**	**0.036**	**0.038**	**0.093**	**0.001**	**2.327**
Integrated ratings	1.002	1.147	0.188	0.039	0.000	0.003	2.379
Catering crew	1.015	1.165	0.098	0.038	0.000	0.003	2.319
All ratings	**1.009**	**1.156**	**0.142**	**0.038**	**0.000**	**0.003**	**2.348**
All crew	**1.007**	**1.155**	**0.085**	**0.038**	**0.050**	**0.002**	**2.337**
Previous quarter	1.005	1.154	0.083	0.038	0.037	0.000	2.317
Initial level [b]	1.021	1.151	0.100	0.038	0.013	0.003	2.327

p preliminary
a. Components may not sum to totals due to rounding.
b. Initial level for September quarter 1993.

Source Data provided by ship operators.

Offshore shipping

Figure 12 presents information on the crew to berth ratio, and its components, for Australian offshore shipping. As the data have not been audited, the December quarter 1999 offshore shipping data in this issue of *Waterline* should be regarded as preliminary. The overall crew to berth ratio for offshore shipping rose to 2.337 in the December quarter 1999, compared with 2.317 in the September quarter, and 2.327 in the March quarter 1995 when monitoring commenced.

Table 11 shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, for the December quarter 1999. Accrued leave is the largest component of the crew to berth ratio for offshore shipping, and comprises paid leave to compensate for work on public holidays, intervals of leave associated with the two-crew duty system, annual leave and time spent travelling in off-duty time. The accrued leave ratio for the December quarter was 1.155, similar to 1.154 in the September quarter.

Ship time also represents a significant part of the offshore crew to berth ratio and reflects days paid for ship duty (which may include travelling time and days signing on and off). The ship time ratio increased to 1.007 in the December quarter, compared with 1.005 in the September quarter.

Other components of the offshore crew to berth ratio were:

- compensation leave, which rose to 0.085, compared with 0.083 in the September quarter, representing a rise of about 2 per cent compared with the previous quarter, and a fall of about 15 per cent compared with the March quarter 1995 figure when offshore shipping monitoring began;
- long service leave, which remained steady at 0.038;
- study leave, which rose to 0.050, compared with 0.037 in the September quarter; and
- training and other leave, which rose to 0.002, compared with zero in the September quarter.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BTE	Bureau of Transport Economics
EBIT	Earnings before interest and tax
GRT	Gross Registered Tonnage
MUA	Maritime Union of Australia
NRT	Net Registered Tonnage
teu	Twenty-foot equivalent unit
UCC	Container ship

DEFINITIONS

Elapsed time —the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed labour rate —the number of containers or teus moved per elapsed hour.

Net time —the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net ship rate —the number of containers or teus moved per net hour.

Crane rate —the number of containers or teus moved per net crane hour.

TABLE 12 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS— PRODUCTIVITY IN TEUS PER HOUR

	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99
Five ports																
Ships handled	748	827	871	907	865	891	907	963	909	845	1020	942	942	958	979	909
Total teus	411538	440098	497140	519206	441697	483372	549247	585474	527881	514409	633107	612019	573444	602501	660593	715413
Crane rate	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5	25.9	25.4	24.6
Elapsed rate	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na	na	na	30.1	30.7
Net rate	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2	37.3	37.7	37.7
Brisbane																
Ships handled	124	133	140	141	156	164	162	177	170	168	192	180	176	193	224	208
Total teus	39037	51008	66115	62904	47471	65572	73184	71043	58857	74023	87373	84200	75444	88311	98944	94919
Crane rate	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6	23.4	23.3	23.6
Elapsed rate	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3	26.7	24.7	25.7
Net rate	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6	32.2	31.2	31.7
Sydney																
Ships handled	206	216	228	249	251	249	243	266	238	219	267	230	221	243	259	244
Total teus	146038	148290	156344	174982	158323	167705	183978	201535	176496	168234	209619	203042	187287	203536	226784	260927
Crane rate	19.5	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4	23.2	24.0	23.7	22.1
Elapsed rate	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6	29.3	30.6	30.1
Net rate	28.0	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3	38.8	38.0	38.9	36.8
Melbourne																
Ships handled	228	262	274	282	230	249	268	281	276	234	309	274	271	282	278	266
Total teus	162911	170884	203371	202376	162156	177070	208200	223465	207346	185803	242456	219549	206727	215379	241775	257147
Crane rate	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5	28.1	27.4	26.5
Elapsed rate	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2	33.1	32.4	33.4
Net rate	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9	39.7	39.9	40.4
Adelaide																
Ships handled	47	63	70	74	69	65	68	66	60	66	63	74	73	66	62	62
Total teus	15955	18803	20519	23351	21963	20933	25982	25188	22260	27975	25493	32556	31326	29569	28271	30597
Crane rate	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0	27.9	27.2	27.2
Elapsed rate	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8	36.3	34.7	35.9
Net rate	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7	37.6	37.2	38.8
Fremantle																
Ships handled	143	153	159	161	159	164	166	173	165	158	189	184	201	174	156	129
Total teus	47597	51113	50791	55593	51784	52092	57903	64243	62922	58374	68166	72672	72660	65706	64819	71823
Crane rate	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6	27.3	26.1	27.2
Elapsed rate	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na	na	25.8	25.8
Net rate	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0	33.4	35.3	38.8

na not available

Notes 1. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial dispute with the MUA.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

3. For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.

ACKNOWLEDGMENTS

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issue 23

waterLine

JUNE 2000

bureau of transport economics

in brief

in brief

- The five-port average crane rate was 20.4 containers per hour in the March quarter 2000, compared with 19.1 for the December quarter 1999, and is the highest achieved since the series commenced.
- The five-port elapsed labour rate of 25.4 containers per hour, and net ship rate of 31.8 containers per hour, both exceeded the previous quarter's figures.
- Berth availability was 94 per cent in the March quarter, up from 88 per cent in the previous quarter, and was at the highest level since the series commenced.
- In 1999, the overall tonnage of cargo moved under coastal permits increased by 25 per cent compared with 1998.
- The development of an Action Agenda has been announced for the freight transport logistics industry.
- The BTE has developed a general framework for undertaking port impact studies in Australia, with a case study of the Port of Fremantle measuring the impact of port-related activities on the Western Australian economy in 1998–99.

at a glance

at a glance

graphs

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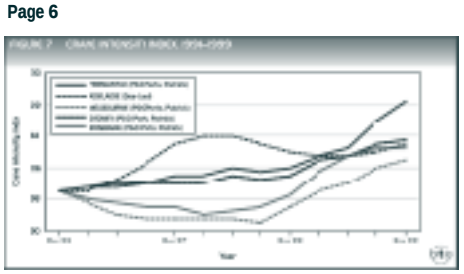

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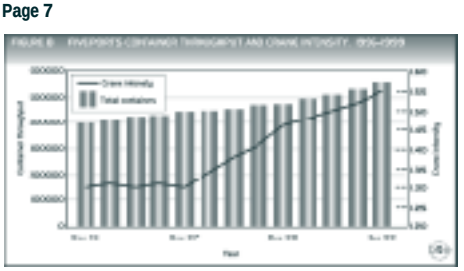

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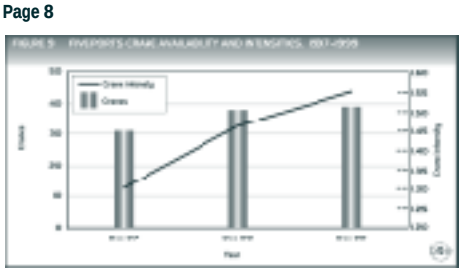

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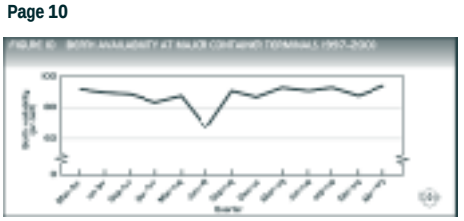
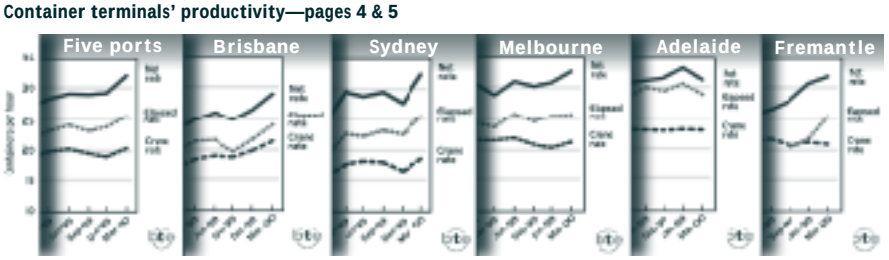


Container terminals' productivity—pages 4 & 5



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STEVEDORING PRODUCTIVITY

Table 1 presents the March quarter 1998 to March quarter 2000 indicators of stevedoring productivity at the five major Australian container ports, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to March quarter 2000 period. The data for Sydney, Melbourne and Fremantle are weighted averages for the terminals operated by P&O Ports and Patrick. The Adelaide data cover the Sea-Land terminal, while the Brisbane data cover the P&O Ports, Patrick and Sea-Land terminals. This is the first occasion that Sea-Land Brisbane stevedoring data have been included in *Waterline*. The Sea-Land terminal at Brisbane commenced operations in July 1998.

Overall, national crane rate productivity, as measured by the five-port average, improved in the March quarter 2000 compared with the December quarter 1999. Excluding the newly incorporated Sea-Land Brisbane data, the five-port average for the March quarter 2000 equalled the June quarter 1999 peak. However, inclusion of the Sea-Land Brisbane data nudged the crane rate productivity slightly ahead to a new peak. During the March quarter 2000, the elapsed labour and net ship rates continued to improve to new highs. Crane intensities (the number of cranes used per ship) also reached new peaks at most terminals during the quarter.

In summary:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 20.4 containers per hour for the March quarter compared with 19.1 in the December quarter 1999;
- the five-port average *elapsed labour rate* (productivity *per ship* based on the time labour is aboard the ship) was 25.4 containers per hour for the March quarter compared with 23.7 in the December quarter 1999; and
- the five-port average *net ship rate* (productivity *per ship* while the ship is worked) was 31.8 containers per hour for the March quarter compared with 29.1 in the December quarter 1999.

During the March quarter 2000, the average crane rates at Brisbane and Sydney exceeded all their previous levels. Compared with the December quarter 1999, the crane rate improved at Melbourne, fell very slightly at Fremantle, and remained almost static at Adelaide. Additionally, among the ten container terminals that submit data for *Waterline*, the elapsed rate rose at seven terminals, and the net ship rate rose at six terminals, compared with the December quarter 1999.

The five-port average ***crane rate*** is the highest achieved *since the series commenced.*

The *Brisbane* average crane rate was 21.2 containers per hour in the March quarter, up from 19.7 in the December quarter. The elapsed labour rate of 23.8 containers per hour and the net ship rate of 28.9 containers per hour were both up on the December quarter figures of 21.5 and 26.4 respectively. The average proportion of elapsed time not worked was approximately 18 per cent.

The *Sydney* average crane rate was 18.6 containers per hour in the March quarter, up from 16.6 in the December quarter. The Sydney elapsed labour rate of 25.4 containers per hour and the net ship rate of 32.2 containers per hour were both up on the December quarter figures. The average proportion of elapsed time not worked was approximately 21 per cent.

The *Melbourne* average crane rate was 21.2 containers per hour in the March quarter, up from 20.3 in the December quarter. The Melbourne elapsed labour rate of 25.7 containers per hour and the net ship rate of 32.6 containers per hour were both up on the December quarter figures. The average proportion of elapsed time not worked was approximately 21 per cent.

The *Adelaide* average crane rate was 23.1 containers per hour in the March quarter, down marginally from 23.2 in the December quarter. The Adelaide elapsed labour rate of 28.9 containers per hour and the net ship rate of 31.2 containers per hour were both down on the December quarter figures. The average proportion of elapsed time not worked was approximately 7 per cent.

The *Fremantle* average crane rate was 20.9 containers per hour in the March quarter, down from 21.2 containers per hour in the December quarter. The elapsed labour rate of 25.3 containers per hour and the net ship rate of 31.8 containers per hour were both up on the December quarter figures. The average proportion of elapsed time not worked was approximately 21 per cent.

TABLE 1 CONTAINER TERMINAL PERFORMANCE INDICATORS— PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	**Mar-98**	**Jun-98**	**Sep-98**	**Dec-98**	**Mar-99**	**Jun-99**	**Sep-99**	**Dec-99**	**Mar-00**
Five ports									
Ships handled	909	845	1020	942	942	958	979	933[r]	875
Total containers	421 769	406 938	493 502	477 744	448 224	469 742	506 696	557 659[r]	517 533
Crane rate	18.8	18.7	19.1	18.9	19.9	20.3	19.6	19.1[r]	20.4
Elapsed labour rate	20.0[a]	20.7[a]	20.7[a]	21.9[a]	23.1[a]	24.0[a]	23.1	23.7[r]	25.4
Net ship rate	23.4	24.7	24.2	26.9	28.2	29.0	28.9	29.1[r]	31.8
Brisbane									
Ships handled	170	168	192	180	176	193	224	232[r]	219
Total containers	49 197	58 939	70 200	67 691	61 204	71 008	77 914	84 354[r]	77 992
Crane rate	18.0	17.3	18.2	16.8	18.3	18.9	18.6	19.7[r]	21.2
Elapsed labour rate	16.4	17.1	18.7	19.6	21.2	21.4	19.5	21.5[r]	23.8
Net ship rate	19.1	20.2	21.9	22.9	24.7	25.9	24.7	26.4[r]	28.9
Elapsed time not worked (per cent)	14	15	15	14	14	18	21	19	18
Sydney									
Ships handled	238	219	267	230	221	243	259	244	221
Total containers	137 600	130 513	160 007	155 063	142 767	154 062	170 684	195 544	171 164
Crane rate	17.5	16.9	16.5	15.7	17.7	18.2	18.0	16.6	18.6
Elapsed labour rate	19.9	20.2	19.2	18.9	22.6	22.2	23.1	22.5	25.4
Net ship rate	25.7	26.2	24.2	24.6	29.5	28.7	29.4	27.6	32.2
Elapsed time not worked (per cent)	23	23	21	23	24	23	21	18	21
Melbourne									
Ships handled	276	234	309	274	271	282	278	266	247
Total containers	166 284	147 122	187 696	170 056	161 894	167 942	183 058	195 723	184 710
Crane rate	19.5	19.2	20.2	21.5	21.5	21.8	20.8	20.3	21.2
Elapsed labour rate	20.1	21.0	21.8	24.3	23.6	25.8	24.5	25.4	25.7
Net ship rate	22.7	24.2	24.5	30.7	28.8	31.0	30.2	30.8	32.6
Elapsed time not worked (per cent)	12	13	11	21	18	17	19	17	21
Adelaide									
Ships handled	60	66	63	74	73	66	62	62	56
Total containers	18 163	23 293	21 444	26 319	24 221	24 445	23 969	26 090	21 803
Crane rate	22.5	23.1	23.2	23.2	23.2	23.1	23.0	23.2	23.1
Elapsed labour rate	29.6	30.4	29.0	29.3	28.5	30.0	29.4	30.6	28.9
Net ship rate	30.7	31.5	30.3	30.4	30.7	31.1	31.5	33.1	31.2
Elapsed time not worked (per cent)	4	3	4	4	7	4	7	7	7
Fremantle									
Ships handled	165	158	189	184	201	174	156	129	132
Total containers	50 525	47 071	54 155	58 615	58 138	52 285	51 071	55 948	61 864
Crane rate	19.6	21.5	22.2	20.7	21.4	21.7	20.7	21.2	20.9
Elapsed labour rate	na	na	na	na	na	na	20.4	21.7	25.3
Net ship rate	21.1	23.9	23.8	25.5	25.6	26.6	28.0	30.7	31.8
Elapsed time not worked (per cent)	na	na	na	na	na	na	27	29	21

na not available
r revised, to include Sea-Land Brisbane data
a. Four-port average only, as Fremantle elapsed rate data were not available.

Notes
1. Data from the Sea-Land terminal at Brisbane are incorporated from the December quarter 1999 onwards.
2. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial dispute with the MUA.
3. The data in this table are expressed in containers (ie. lifts or moves) per hour and therefore are not directly comparable with the teus per hour data in table 10.
4. Elapsed time not worked is the difference between the net and elapsed rates as a percentage of the net rate.

Sources Patrick, P&O Ports and Sea-Land (see Indemnity Statement on back page).

CONTAINER TERMINAL PRODUCTIVITY

FIGURE 1 FIVE MAJOR PORTS

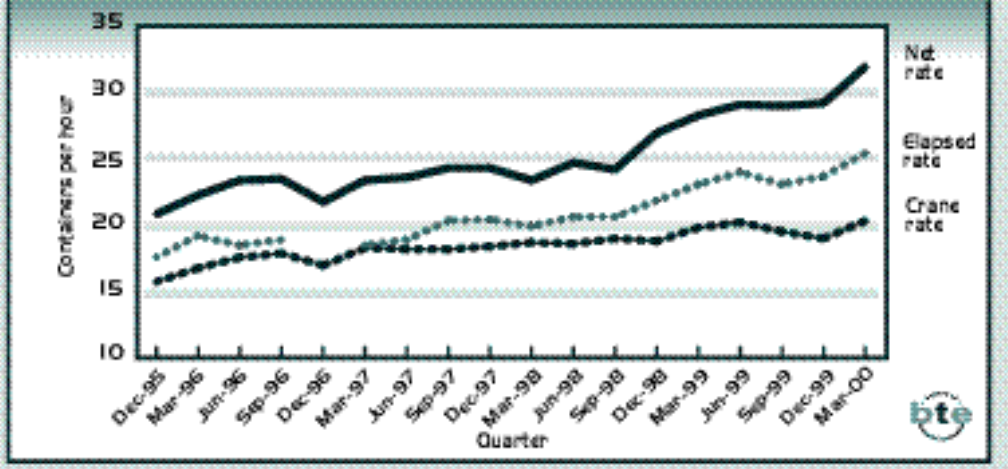


FIGURE 2 BRISBANE

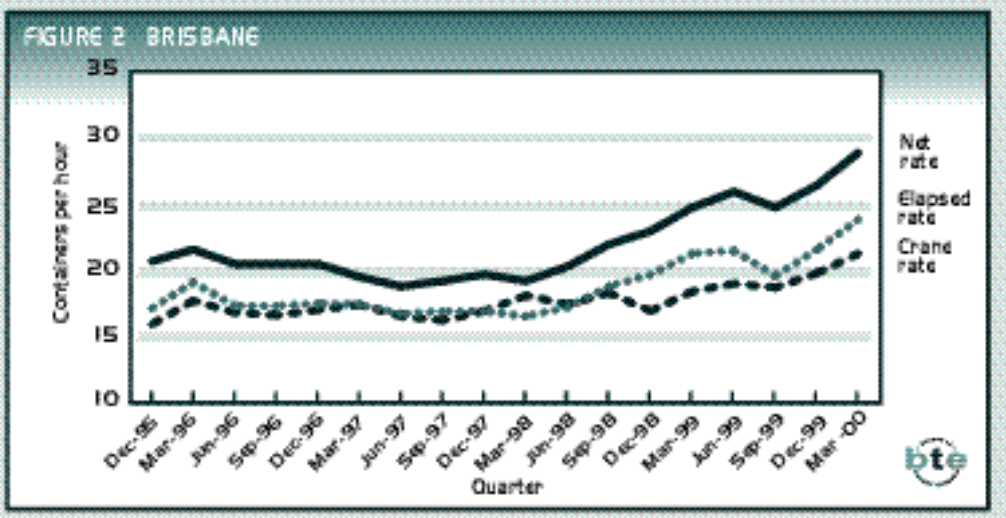
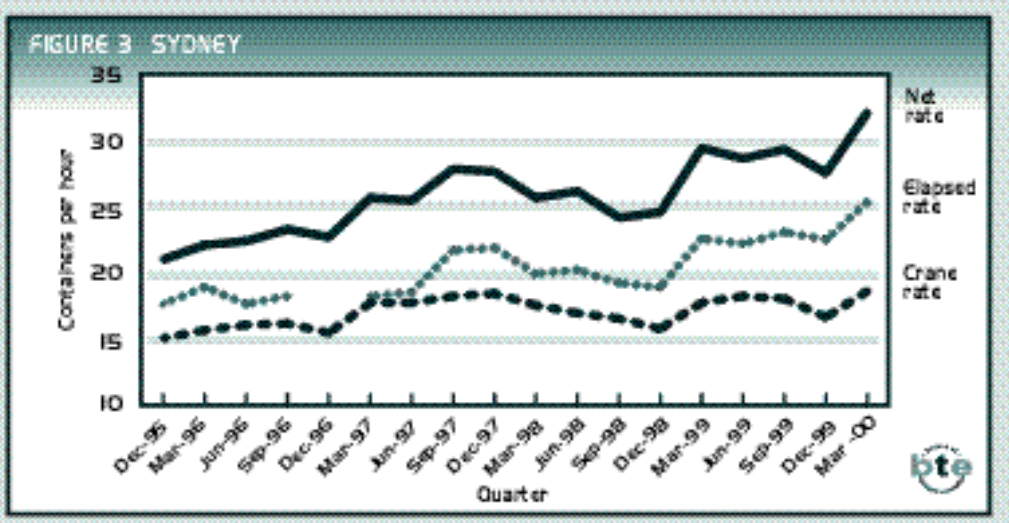


FIGURE 3 SYDNEY



Note These figures are based on the data contained in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

CONTAINER TERMINAL PRODUCTIVITY

FIGURE 4 MELBOURNE

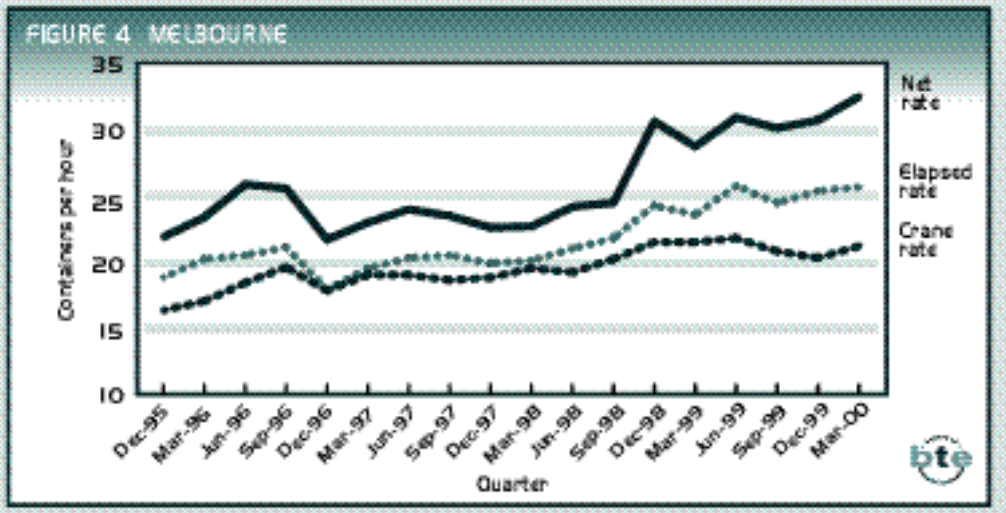


FIGURE 5 ADELAIDE

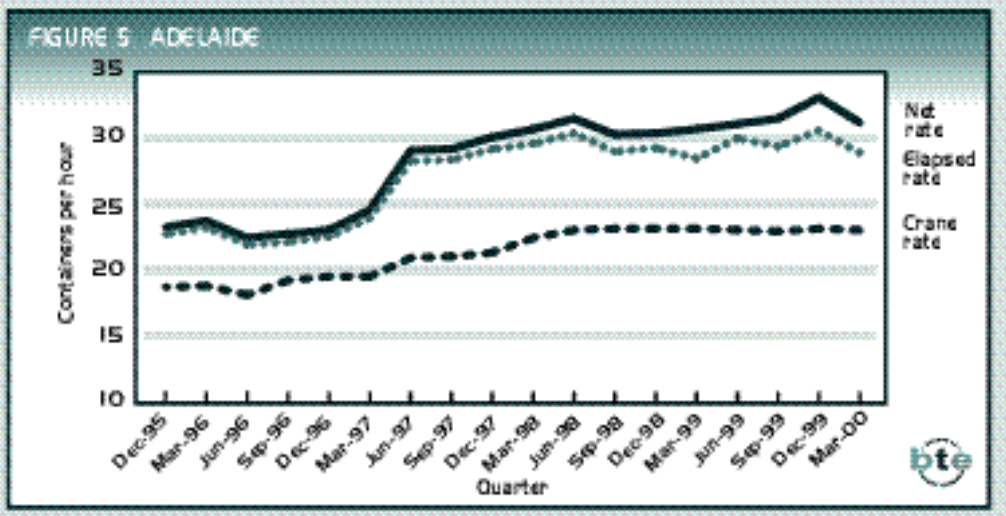
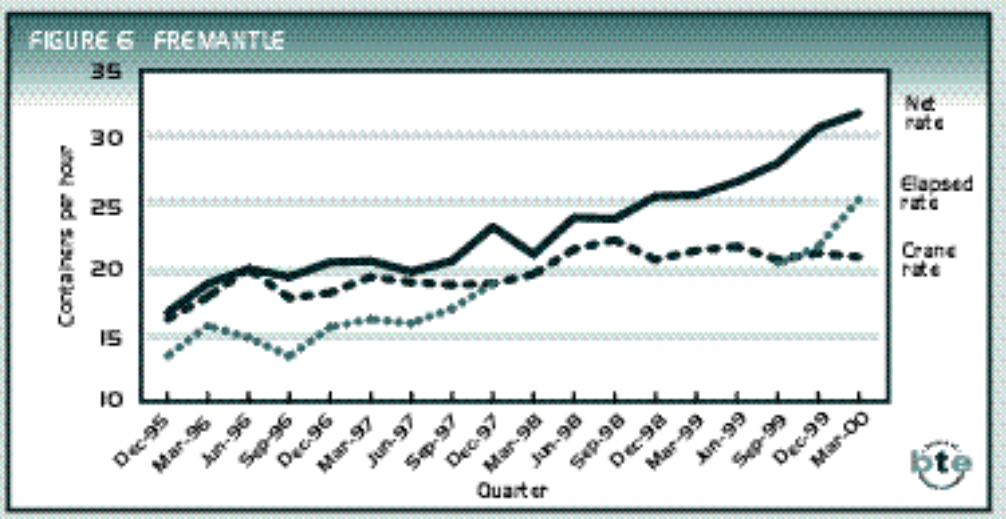


FIGURE 6 FREMANTLE



Note These figures are based on the data contained in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

Container port activity

Table 1 also provides information on container ship visits and container throughput at each of the five mainland capital city ports. The March quarter 2000 five-port average showed ship visits decreased by 6 per cent, and container throughput decreased by 7 per cent, compared with the December quarter 1999. The declines occurred at all ports except Fremantle. Leading as they do into Christmas, September and December quarter throughputs traditionally surge in Australia. By comparison, the follow-on March quarter records lower-volume container movements. However, even discounting Sea-Land Brisbane data, the March quarter 2000 throughput was the second highest container exchange on record. It exceeded the September quarter 1999 throughput by about half of one per cent, but was second to the unusually high December quarter 1999 throughput.

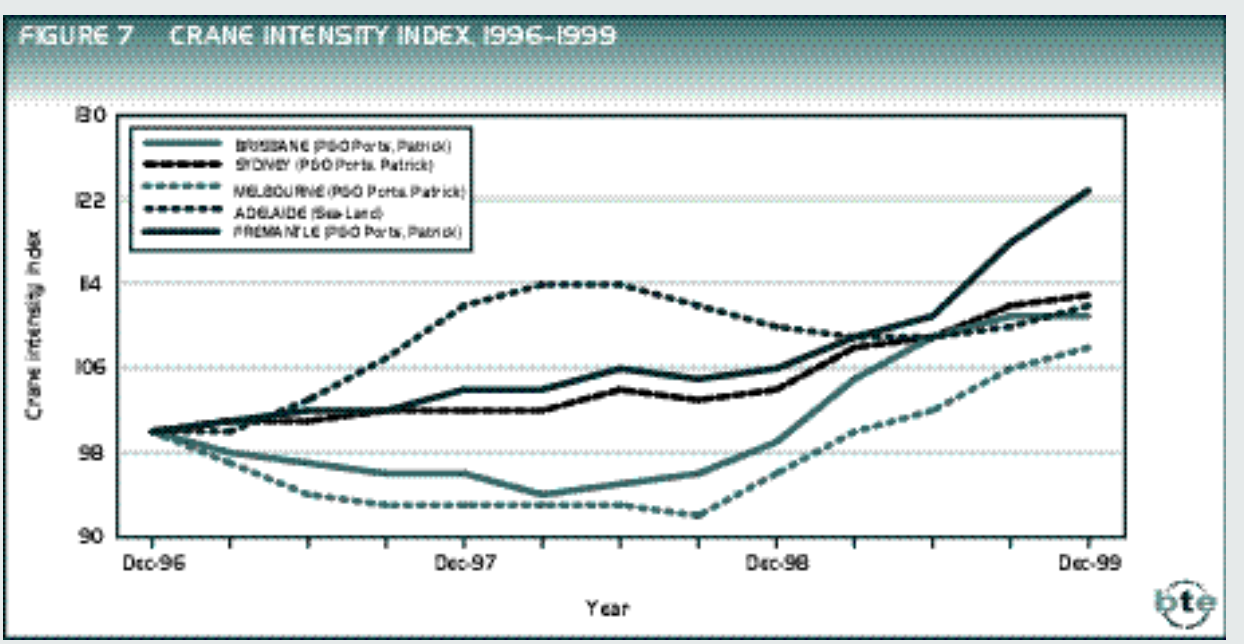
...although ***fewer ship visits*** are made, the average container exchange ***per ship*** has ***increased*** ***significantly***

Compared with the March quarter of the previous year, and discounting Sea-Land Brisbane data, the five-port average for container ship visits decreased by 7 per cent, while the five-port average for container throughput increased by 15 per cent. This reflects a change in shipping patterns whereby, although fewer ship visits are made, the average container exchange per ship has increased significantly.

On a port-by-port basis, the March quarter 2000 *container exchange* at:

- Brisbane was down 8 per cent on the December quarter figure and, discounting Sea-Land because comparative data are unavailable, up 13 per cent compared with the March quarter 1999;
- Sydney was down 12 per cent on the December quarter figure, and up 20 per cent compared with the March quarter 1999;

FIGURE 7 CRANE INTENSITY INDEX, 1996-1999



Sources Patrick, P&O Ports and Sea-Land.

- Melbourne was down 6 per cent on the December quarter figure, and up 14 per cent compared with the March quarter 1999;
- Adelaide was down 16 per cent on the December quarter figure, and down 10 per cent compared with the March quarter 1999; and
- Fremantle was up 11 per cent on the December quarter figure, and up 6 per cent compared with the March quarter 1999.

Crane intensities

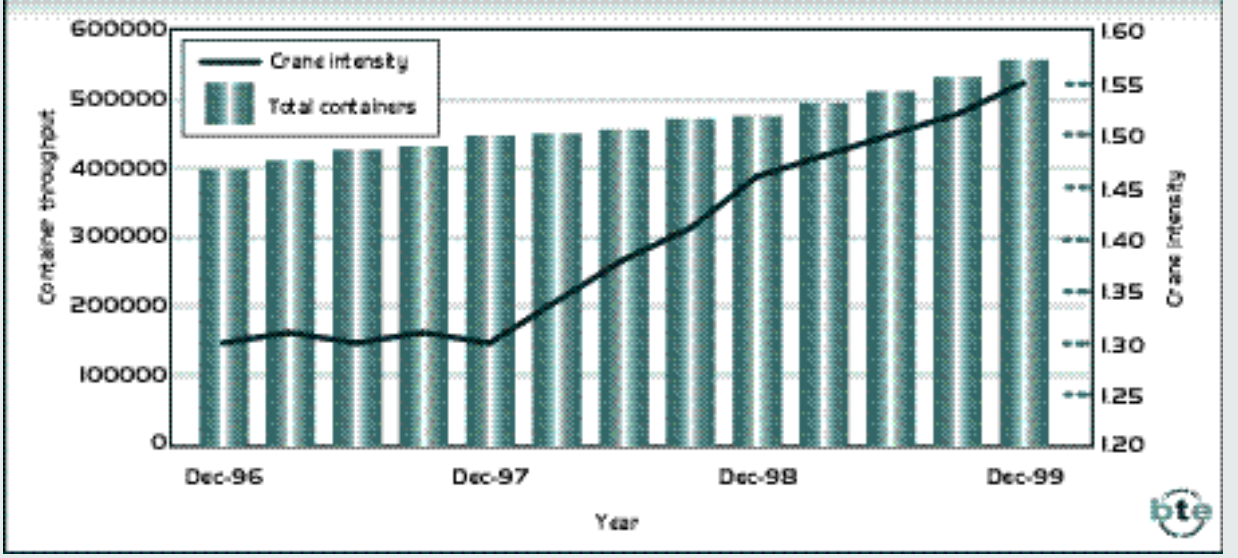
Crane intensity is defined as the number of cranes used during the period the ship is worked, and can be determined fairly closely by dividing the net ship rate by the net crane rate. The number of cranes used by a stevedore to work a ship depends on:

- the size of the ship;
- the stowage pattern and number of containers to be exchanged;
- the total number of cranes at the terminal;
- crane availability; and
- the cost of using the cranes (in terms of labour and maintenance).

Using an index of 100 for crane intensity at the end of 1996, figure 7 shows changes in intensity at the ports between then and the end of 1999. Overall, crane intensities have risen at all Australian container ports.

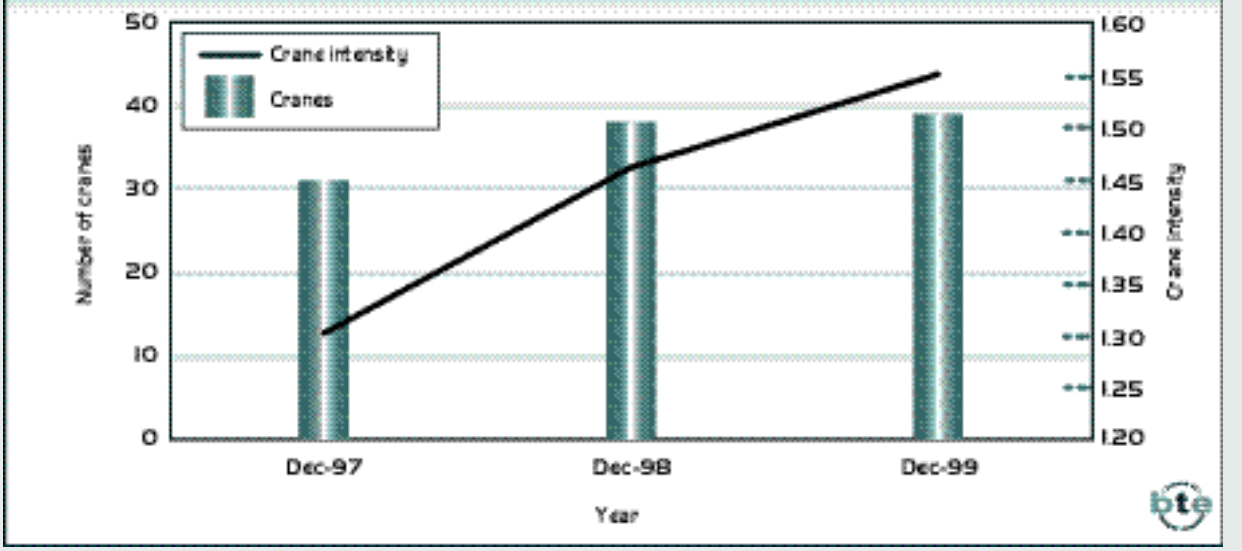
Figures 8 and 9 plot the five-port crane intensity against container throughput and crane availability respectively. Both charts show rises in throughput and total number of cranes accompanying the rise in crane intensity.

FIGURE 8 FIVE-PORTS CONTAINER THROUGHPUT AND CRANE INTENSITY, 1996–1999



Sources Patrick, P&O Ports and Sea-Land.

FIGURE 9 FIVE-PORTS CRANE AVAILABILITY AND INTENSITIES, 1997–1999



Sources Patrick, P&O Ports and Sea-Land.

Crane intensity is an important issue when measuring stevedoring productivity. The speed at which a ship is worked (ie the elapsed labour rate and net ship rate) can be improved by employing more cranes to the task of working the ship. However, there is a trade-off. Employing more cranes can lead to a fall in the productivity of each crane (ie the crane rate). In the end, how the stevedore balances the trade-off between higher ship rates and lower crane rates will depend on the needs of the stevedore's client (the ship operator), as defined by the commercial contract between the two parties.

Teus per hour

Table 10 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purpose of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. They cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the March quarter 2000. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

The sample for the March quarter 2000 covers 283 ship calls, equivalent to 32 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 20 per cent at Brisbane to 52 per cent at Adelaide. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

Berth availability for the sample of ship calls was 94 per cent

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 94 per cent in the March quarter 2000. This was up from the figure of 88 per cent that was recorded in the December quarter 1999. Caution should be used in undertaking inter-port comparisons of the berth availability data, as there is significant variation between ports in sample sizes and ship call patterns.

Figure 10 provides information on berth availability since the March quarter 1997. The figure of 94 per cent recorded in the March quarter 2000 was the highest level for the berth availability indicator since the series commenced.

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 16 hours in the March quarter 2000. This was down from the figure of 21 hours that was recorded in the previous quarter.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportion was 100 per cent for each indicator in the March quarter 2000. Performance has been at similar levels since the first data (covering the March quarter 1997) were published in *Waterline*.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, MARCH QUARTER 2000

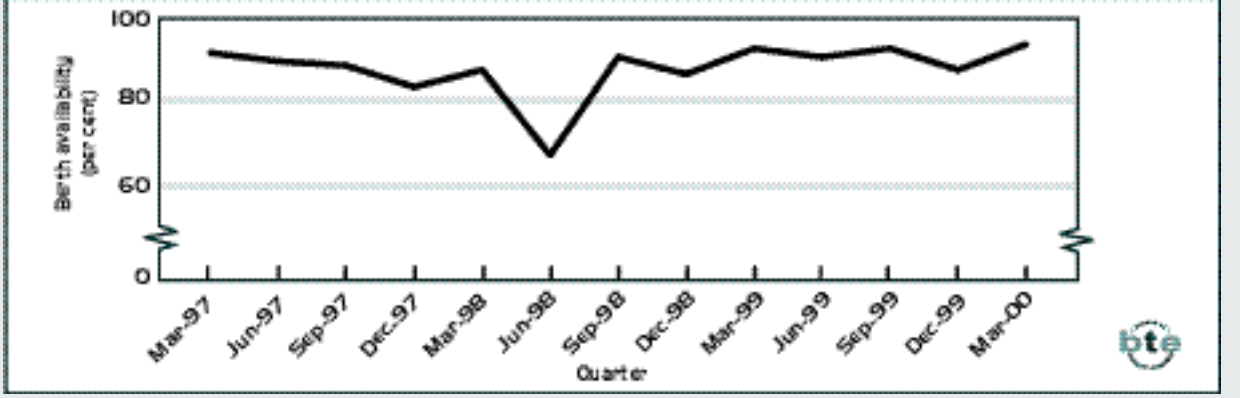
(Number of ship calls)

Port/operation	Delay (hrs) 0	1	2	3	4	5–10	11–20	>20	Total no. of ship calls
Brisbane									
Berth availability	**40**	**0**	**1**	**1**	**0**	1	0	0	43
Pilotage	**43**	**0**	0	0	0	0	0	0	43
Towage	**43**	**0**	0	0	0	0	0	0	43
Sydney									
Berth availability	**65**	**1**	**0**	**0**	**0**	1	1	2	70
Pilotage	**70**	**0**	0	0	0	0	0	0	70
Towage	**70**	**0**	0	0	0	0	0	0	70
Melbourne									
Berth availability	**84**	**1**	**1**	**2**	**0**	2	6	3	99
Pilotage	**99**	**0**	0	0	0	0	0	0	99
Towage	**99**	**0**	0	0	0	0	0	0	99
Adelaide									
Berth availability	**27**	**0**	**0**	**1**	**0**	1	0	0	29
Pilotage	**29**	**0**	0	0	0	0	0	0	29
Towage	**29**	**0**	0	0	0	0	0	0	29
Fremantle									
Berth availability	**39**	**0**	**1**	**2**	**0**	0	0	0	42
Pilotage	**42**	**0**	0	0	0	0	0	0	42
Towage	**42**	**0**	0	0	0	0	0	0	42
Five ports									
Berth availability	**255**	**2**	**3**	**6**	**0**	5	7	5	283
Pilotage	**283**	**0**	0	0	0	0	0	0	283
Towage	**283**	**0**	0	0	0	0	0	0	283

Note *Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns.*

Sources *Data for a sample of ship calls provided by shipping lines.*

FIGURE 10 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997–2000



Sources Data for a sample of ship calls provided by shipping lines.

Other waiting time

The five shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

Table 3 summarises the data on other waiting time incidents in the March quarter 2000. The shipping lines identified a total of 199 incidents (affecting 145 ship calls) for the sample of ship calls over this period. These incidents involved both ship-related and waterfront factors.

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, MARCH QUARTER 2000

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5–10	11–20	>20	Total no. of incidents
Awaiting labour	8	8	7	8	16	3	1	51
Stevedoring finished early	13	15	4	0	2	0	0	34
Pilot/tug booking not at preferred time	11	7	3	2	2	1	0	26
Early ship arrival	3	6	6	7	2	0	0	24
Crane breakdown	3	5	3	2	4	1	0	18
Ship repairs or maintenance	0	0	2	2	3	1	1	9
Weather or tides	1	1	2	0	1	1	0	6
Stevedoring finished late	2	0	0	0	1	0	0	3
Late ship arrival	0	1	0	0	1	0	0	2
Industrial action	0	0	0	1	0	0	0	1
Other	5	5	4	1	2	2	6	25
Total incidents	**46**	**48**	**31**	**23**	**34**	**9**	**8**	**199**[a]

a. *These incidents affected 145 of the 283 ship calls covered in table 2.*

Sources Data for a sample of ship calls provided by shipping lines.

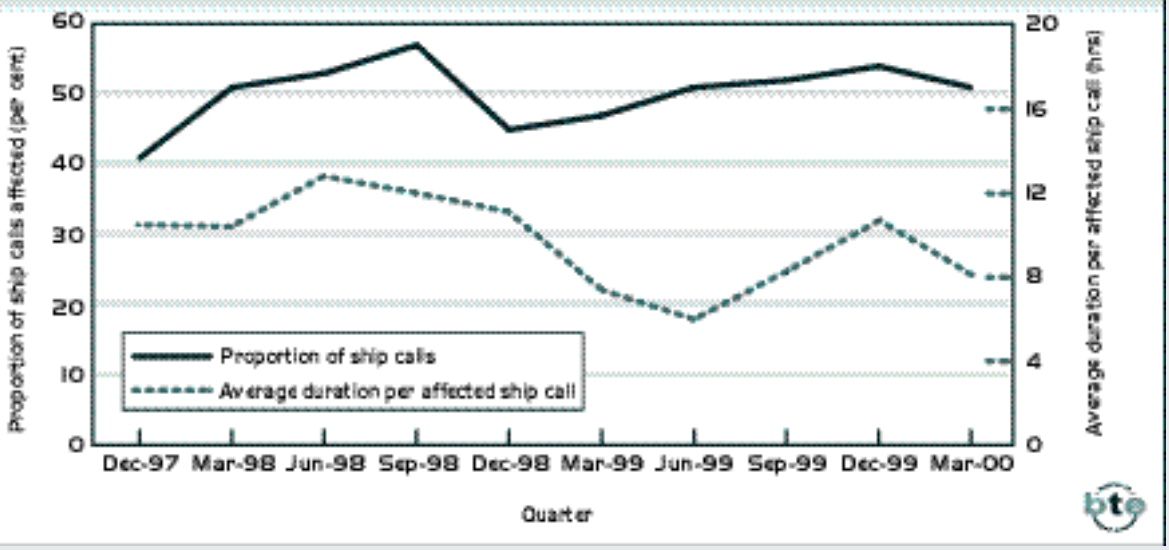
The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The data provided by shipping lines indicate that six incident types accounted for around one-half of the total hours attributed to other ship waiting time in the March quarter 2000:

- awaiting stevedoring labour (21 per cent);
- ship repairs or maintenance (6 per cent);
- early ship arrival (6 per cent);
- completion of stevedoring earlier than forecast (6 per cent);
- crane breakdowns (6 per cent); and
- unable to book tugs or pilots at preferred time (6 per cent).

In the March quarter 2000, 51 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. The corresponding proportion in the December quarter 1999 was 54 per cent. The average duration of other waiting time was 8 hours per affected ship call in the March quarter 2000, down from 11 hours per affected ship call in the previous quarter.

Figure 11 provides information on other ship waiting time over the period since the December quarter 1997. It indicates the proportion of ship calls affected and the average duration of other waiting time per affected ship call in each quarter. The series on average duration has been revised in this issue of *Waterline*, with figures prior to the March quarter 1999 being amended to ensure that they are prepared on the same basis as later figures.

FIGURE 11 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, 1997–2000



Sources Data for a sample of ship calls provided by shipping lines.

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals—stevedoring rate and cargo receival. Data are not available for Adelaide.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. Compared with the previous quarter, the stevedoring rate indicator increased at Melbourne and Fremantle in the March quarter 2000. There was a slight decline at Sydney.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial measure of one factor that can affect container terminal performance. Compared with the previous quarter, the cargo receival indicator did not change significantly at the ports for which data are available in the March quarter 2000.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation *at 24 hours prior to actual arrival*.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, DECEMBER QUARTER 1999 AND MARCH QUARTER 2000

(per cent)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar	Oct–Dec	Jan–Mar
Stevedoring										
Stevedoring rate	50	na	62	59	46	50	na	na	38	43
Cargo receival	91	na	82	80	94	94	na	na	97	99
Ship arrival										
Advice at 24 hrs	52	na	46	50	na	na	57	51	54	56
Advice inside 24 hrs	93	na	94	98	na	na	90	93	88	88

na not available

Sources AAPMA, Patrick and P&O Ports.

Compared with the previous quarter, this indicator increased at Sydney and Fremantle, and declined at Adelaide, in the March quarter 2000.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. Compared with the previous quarter, this indicator increased at Sydney and Adelaide, and was unchanged at Fremantle, in the March quarter 2000.

SOME RECENT BTE PUBLICATIONS

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REGIONAL IMPACT OF PORTS

In April this year, the BTE released the results of a study of the regional impact of ports. BTE Report 101 presents a general framework for undertaking port impact studies in Australia, and a case study of the Port of Fremantle. It was undertaken with the cooperation of the Association of Australian Ports and Marine Authorities (AAPMA), the Fremantle Port Authority, and members of the Fremantle port community.

A port impact study measures the output, value added, income and employment that are generated by the operation of a port in a recent year. Total impact is the sum of the direct effects and the subsequent flow-on effects to other sectors of the regional economy.

General framework

The general framework developed by the BTE identifies six major steps in the preparation of a port impact study:

- selecting an appropriate methodology;
- deciding on key parameters (eg definition of the port industry);
- collecting the data;
- processing and adjusting the data;
- preparing the estimates of port impact; and
- reporting the results in an appropriate format.

The standard approach in the general framework incorporates a detailed survey of the organisations involved in port-related activities. Input-output tables are used to estimate the flow-on effects to other sectors of the regional economy. A successful port impact study requires strong support from the port community.

BTE Report 101 provides definitions of key terms such as economic impact and the port industry. It distinguishes regional economic impact from other concepts such as net economic benefits, effects on the broader (eg national) economy, technical efficiency, competitiveness and trade facilitation effects.

The definition of the port industry in the general framework incorporates all activities that are required for the movement of commercial trading vessels, cargoes and passengers through the port. Therefore, a port impact study based on the general framework will not include the economic benefits of exports and imports, or the impact of activities in the port area that are not involved in the transport of cargo.

Port of Fremantle

The BTE undertook a study of the Port of Fremantle in order to illustrate the practical issues involved in a port impact study. The case study also provided information for the development of the general framework.

The study of the Port of Fremantle was undertaken between June and December 1999, using the standard approach specified in the general framework. A survey of 198 organisations involved in port-related activities provided extensive information on the direct effects of the port and on linkages to the rest of the State economy. Flow-on effects were estimated using Western Australian input-output tables, which were modified to provide port-specific multipliers.

The overall results of the case study are summarised in table 5. Value added attributable to the operation of the port (direct and flow-on effects) in 1998–99 was equivalent to around 0.9 per cent of Western Australia's Gross State Product. The 5792 jobs (full-time equivalent) represented around 0.8 per cent of total employment in Western Australia.

The results of the case study indicate that, on average, each ship call at the Port of Fremantle involved the following impact on Western Australia in 1998–99:

- $411 000 of output;
- $248 000 of value added;
- $126 000 of household income;
- 3.3 jobs (full-time equivalent).

Table 6 provides detailed measures of the total impact of the port. It indicates that there was significant variation in the contribution of individual port functions and cargo types. The variation for individual cargo types was reflected in the relative contributions of the Inner Harbour (non-bulk cargoes) and the Outer Harbour (bulk cargoes).

TABLE 5 ECONOMIC IMPACT (DIRECT AND FLOW-ON EFFECTS) OF THE PORT OF FREMANTLE, 1998–99

Impact measure	Direct effects	Flow-on effects	Total impact
Output ($m)	341	387	728
Value added ($m)	215	225	440
Household income ($m)	124	99	223
Employment (no.)[a]	2 294	3 499	5 792

a. Number of full-time equivalent jobs.

Note Components may not sum to totals due to rounding.

Source BTE Report 101, 'Regional Impact of Ports', p. xvii.

The BTE also undertook some work on the impact of expenditure by crews from visiting US naval vessels at the Port of Fremantle (not included in tables 5 and 6). Total impact (including flow-on effects) was conservatively estimated at around $22 million in terms of output and 193 jobs (full-time equivalent) in 1998–99.

TABLE 6 DETAILED MEASURES OF THE ECONOMIC IMPACT (DIRECT AND FLOW-ON EFFECTS) OF THE PORT OF FREMANTLE, 1998–99

Component	Output ($m)	Value added ($m)	Household income ($m)	Employment (no.)[a]
Function				
Ship loading/unloading	218	135	72	1 694
Ship operations	162	101	54	1 401
Land transport & storage	141	82	37	1 033
Cargo services	99	61	31	897
Port authority operations	87	48	22	555
Government agencies	21	13	8	213
Total	*728*	*440*	*223*	*5 792*
Cargo type				
Containers	382	240	125	3 195
Dry bulk	181	100	50	1 339
Other general cargo	96	59	31	800
Liquid bulk	67	38	17	441
Other	2	1	1	19
Total	*728*	*440*	*223*	*5 792*
Port area				
Inner Harbour	470	293	152	3 896
Outer Harbour	258	146	71	1 896
Total	*728*	*440*	*223*	*5 792*

a. Number of full-time equivalent jobs.

Note Components may not sum to totals due to rounding.

Source BTE Report 101, 'Regional Impact of Ports', p. xix.

Further information

BTE Report 101 *Regional Impact of Ports* (ISBN 0 642 43292 9) is available from Government InfoShops (AusInfo) telephone toll-free 132 447. To obtain more information about the BTE's work on port impact studies, contact the project leader Kym Starr on (02) 6274 6857 or kym.starr@dotrs.gov.au.

COASTAL SHIPPING PERMITS

During 1999, the overall tonnage of cargo moved under a combination of single voyage permits (SVPs) and continuing voyage permits (CVPs) increased by 25 per cent compared with the previous year, and by 129 per cent compared with 1995.

TABLE 7 SINGLE VOYAGE PERMITS ISSUED

	March quarter		June quarter		September quarter		December quarter		TOTAL	
Year	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes	Permits	Tonnes
1991	44	262 431	26	189 565	34	422 161	61	414 191	165	1 288 348
1992	49	243 049	59	241 373	62	238 017	69	147 514	239	869 953
1993	83	211 430	93	298 769	108	202 252	125	292 664	409	1 005 115
1994	119	412 029	118	498 571	110	899 222	112	970 068	459	2 779 890
1995	116	832 308	90	665 499	91	1 077 022	100	653 940	397	3 228 769
1996	107	575 662	123	930 077	142	1 026 438	146	1 110 332	518	3 642 509
1997	135	661 784	149	1 056 709	197	1 307 362	214	1 009 151	695	4 035 006
1998	184	1 266 030	184	1 301 204	186	1 584 240	187	1 580 034	741	5 731 508
1999	144	1 336 882	187	2 381 904	168	1 799 908	149	1 526 375	648	7 045 069
2000	143	1 677 346								

na not available

Note From mid-1997, the data have been collected as SVPs issued; prior data were collected as SVPs used. As most SVPs issued are also used, the differences in the data are likely to be insignificant.

Source Cross-Modal & Maritime Transport Division, Department of Transport & Regional Services.

Single voyage permits

Table 7 updates the information published in *Waterline* 21. It presents data on the number of SVPs issued, and tonnes of cargo carried, over the period from the September quarter 1990 to the March quarter 2000. The number of SVPs issued in the March quarter 2000 declined by 4 per cent compared with the December quarter 1999, while the associated tonnes of cargo carried increased by 10 per cent.

Total SVPs issued in the 1999 calendar year declined by about 13 per cent compared with the number issued in 1998, but was 63 per cent higher than the number issued in 1995. Tonnes of cargo carried using SVPs increased by 23 per cent compared with 1998, and by 118 per cent compared with 1995. The indicators for the past year show that, although the total number of SVPs issued has declined, the associated total tonnage carried has increased. The decline in SVPs issued may be a reflection of the marked increase in CVPs issued over the past year.

TABLE 8 SUMMARY OF SINGLE VOYAGE PERMITS ISSUED, 1 OCTOBER 1999 TO 31 MARCH 2000

Cargo category	Permits issued	Tonnes carried
Bulk cargo		
Petroleum products	48	893 034
Crude oil & feedstocks	12	572 400
Liquefied gas	16	54 340
Other bulk liquids	7	48 000
Dry bulk	59	1 272 002
General cargo		
Containerised	129	348 077
Break bulk	21	15 868
Total	**292**	**3 203 721**

Source Cross-Modal & Maritime Transport Division, Department of Transport & Regional Services.

Table 8 shows a breakdown of SVPs by cargo types for the half year from 1 October 1999 to 31 March 2000. Containerised cargo permits continue to be the major component of the total number of permits issued. On the other hand, bulk cargo continues to account for around 90 per cent of total tonnage moved under permit.

Continuing voyage permits

While CVPs have been available for some time, they were rarely requested or issued prior to 1998. However, during the 1999 calendar year, 59 CVPs were issued. Each CVP covers a six-month period which usually translates into six voyages that may otherwise have been undertaken under SVP. During 1999, approximately 350 000 tonnes of coastal trade were committed to be moved using CVPs, that is, about one-twentieth the tonnage moved by SVPs.

TABLE 9 CONTINUING VOYAGE PERMITS ISSUED

	March quarter		June quarter		September quarter		December quarter	
Year	Permits	Tonnes[a]	Permits	Tonnes[a]	Permits	Tonnes[a]	Permits	Tonnes[a]
1999	4	53 400	22	171 753	14	127 011	19	483 104
2000	14	212 080						

a. Tonnes committed to be carried under continuing voyage permits.

Source Cross-Modal & Maritime Transport Division, Department of Transport & Regional Services.

General information

Part VI of the *Navigation Act 1912* provides for licensed vessels to carry passengers and cargo in the coasting trade. The Act does not restrict the class of vessels that may obtain a coasting trade licence. Any ship, regardless of registry, is able to obtain a licence provided the crew is paid Australian wage rates while it is engaged in the coasting trade, the ship is not in receipt of foreign government subsidies, and has not received such a subsidy in the previous twelve months.

Ships that obtain a licence must also conform to the requirements of the Navigation Act, including specified safety, manning and crew qualifications, and rehabilitation and compensation provisions. Where suitable licensed vessels are not available, the Act also provides for the issue of single or continuing voyage permits to unlicensed vessels—where this is considered to be in the public interest. The application fee for a passenger SVP is $22 and for a cargo SVP is $200. The application fee for a CVP is $400.

More information on coastal permits can be found on the Department of Transport and Regional Services' internet site at http://www.dotrs.gov.au/.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
BTE	Bureau of Transport Economics
DoTRS	Department of Transport and Regional Services
CVP	Continuing Voyage Permit
eg	for example
GDP	Gross Domestic Product
ie	that is
MUA	Maritime Union of Australia
SVP	Single Voyage Permit
teu	twenty-foot equivalent unit
TLWG	Transport Logistics Working Group
US	United States of America

DEFINITIONS

Elapsed labour time—the total time over which the ship is worked, measured from labour aboard to labour ashore.

Elapsed labour rate—the number of containers or teus moved per elapsed hour.

Net ship time—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

Net ship rate—the number of containers or teus moved per net hour.

Crane rate—the number of containers or teus moved per net crane hour.

TABLE 10 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—PRODUCTIVITY IN TEUS PER HOUR

	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00
Five ports																	
Ships handled	748	827	871	907	865	891	907	963	909	845	1020	942	942	958	979	933r	875
Total teus	411538	440098	497140	519206	441697	483372	549247	585474	527881	514409	633107	612019	573444	602501	660593	726590r	678046
Crane rate	20.3	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5	25.9	25.4	24.8r	26.6
Elapsed rate	23.2	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na	na	na	30.1	30.8r	33.3
Net rate	27.1	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2	37.3	37.7	37.8r	41.7
Brisbane																	
Ships handled	124	133	140	141	156	164	162	177	170	168	192	180	176	193	224	232r	219
Total teus	39037	51008	66115	62904	47471	65572	73184	71043	58857	74023	87373	84200	75444	88311	98944	106096r	97431
Crane rate	20.0	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6	23.4	23.3	24.6r	26.4
Elapsed rate	21.5	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3	26.7	24.7	27.0r	29.8
Net rate	24.4	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6	32.2	31.2	33.1r	36.1
Sydney																	
Ships handled	206	216	228	249	251	249	243	266	238	219	267	230	221	243	259	244	221
Total teus	146038	148290	156344	174982	158323	167705	183978	201535	176496	168234	209619	203042	187287	203536	226784	260927	229014
Crane rate	19.5	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4	23.2	24.0	23.7	22.1	24.8
Elapsed rate	23.8	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6	29.3	30.6	30.1	34.0
Net rate	28.0	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3	38.8	38.0	38.9	36.8	43.0
Melbourne																	
Ships handled	228	262	274	282	230	249	268	281	276	234	309	274	271	282	278	266	247
Total teus	162911	170884	203371	202376	162156	177070	208200	223465	207346	185803	242456	219549	206727	215379	241775	257147	243277
Crane rate	20.5	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5	28.1	27.4	26.5	27.9
Elapsed rate	24.4	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2	33.1	32.4	33.4	33.8
Net rate	28.3	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9	39.7	39.9	40.4	43.0
Adelaide																	
Ships handled	47	63	70	74	69	65	68	66	60	66	63	74	73	66	62	62	56
Total teus	15955	18803	20519	23351	21963	20933	25982	25188	22260	27975	25493	32556	31326	29569	28271	30597	27736
Crane rate	21.5	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0	27.9	27.2	27.2	29.4
Elapsed rate	26.6	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8	36.3	34.7	35.9	36.8
Net rate	27.2	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7	37.6	37.2	38.8	39.7
Fremantle																	
Ships handled	143	153	159	161	159	164	166	173	165	158	189	184	201	174	156	129	132
Total teus	47597	51113	50791	55593	51784	52092	57903	64243	62922	58374	68166	72672	72660	65706	64819	71823	80588
Crane rate	21.2	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6	27.3	26.1	27.2	27.4
Elapsed rate	18.3	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na	na	25.8	27.9	33.0
Net rate	22.2	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0	33.4	35.3	38.8	41.6

na not available
r revised, to include Sea-Land Brisbane data
Notes 1. Data from the Sea-Land terminal at Brisbane are incorporated from the December quarter 1999 onwards.
2. The June quarter 1998 figures do not include data for Patrick covering the 8 April to 7 May 1998 period of the major industrial dispute with the MUA.
3. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.
4. For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.

THE AUSTRALIAN FREIGHT TRANSPORT LOGISTICS INDUSTRY ACTION AGENDA

On 24 May 2000, the Minister for Industry, Science and Resources, Senator Nick Minchin announced that the freight transport logistics industry had been chosen for the development of an industry Action Agenda. The Minister for Transport and Regional Services, Deputy Prime Minister John Anderson, welcomed the decision.

What is an Action Agenda?

Announced in *Investing for Growth* (December 1997), Action Agendas are a key element of the Australian Government's industry strategy. They are designed to build a dynamic partnership between industry and government to achieve sustainable economic growth in a competitive global environment.

Action Agendas identify impediments to growth and develop strategies to remove them, examine and capitalise on opportunities, and generate the momentum for industry to act for itself. For further information on Action Agendas, refer to the Department of Industry, Science and Resources' website at: www.isr.gov.au/agendas

What is freight transport logistics?

Freight transport logistics refers to all actions concerned with the *movement* of goods through the logistics chain—from point of origin, through the point of consumption, to the point of disposal. Consequently, the focus of the Action Agenda is on the role of transport in the logistics chain. However, other logistics issues such as purchasing, distribution, storage and packaging, as well as passenger transport services, will have an influence on the future of the freight transport logistics industry.

How important is freight transport logistics?

The Australian freight transport logistics industry is a major contributor to the wealth of this nation and is an increasingly integral part of core Australian business practice and the economy. The Australian Bureau of Statistics estimated that transport and storage alone contributed 7 per cent to GDP in 1997–98. The contribution of freight transport logistics is likely to be significantly greater, and one of the immediate tasks of the Action Agenda process will be to better determine that contribution.

Why the need for an Australian freight transport logistics Action Agenda?

As a significant input to industry, better transport logistics service delivery can represent significant cost reductions to the domestic economy, while simultaneously improving the international competitiveness of Australian export industries.

...freight transport logistics industry is a ***major contributor*** to the wealth of this **nation**

Australia's traditional role of supplying the world with primary products and minerals has not required sophisticated transport logistics services. As Australian exports become more diverse in nature, and with the increasing pressure for Australian exporters to become part of the global network, the need for transport logistics solutions that solve more complex logistics problems has intensified.

In the case of imports, a more efficient and effective national transport system translates into greater opportunities for importers to develop alternative distribution patterns in Australia. This translates into advantages for industry where imports are essential inputs, and helps sustain accessible competitive transport logistics services that can be utilised by our exporters.

In the global context, the growth of telecommunications and information technology services has resulted in transport logistics services becoming an essential component in the formation of global alliances. Without the development of internationally competitive Australian transport logistics services, Australia will lose out on the opportunity to fully integrate our transport logistics services with the global network. As a result, Australian industry as a whole would find it more difficult to establish global partnerships.

Improved logistics services can also make significant contributions to broad social issues such as reducing greenhouse gas emissions and urban road congestion, and improved services to rural and remote communities.

To achieve the benefits of an efficient and effective transport logistics industry in Australia, an action plan that coordinates the resources of those seeking to improve the Australian logistics industry is required.

How will the Action Agenda for Australian freight transport logistics work?

Building on the relationships developed between all levels of government and industry as part of the Prime Minister's Supermarket to Asia Initiative, the Action Agenda will provide the framework for expanding Commonwealth, State and Territory government, and industry cooperation to encompass all aspects of the freight transport logistics industry. The Action Agenda will also incorporate work already developed through the recently announced National Intelligent Transport Systems Strategy.

A whole-of-government approach

There are several Commonwealth departments with an active interest in the issues concerning the freight transport logistics industry, including: Transport and Regional Services; Agriculture, Fisheries and Forestry Australia; Foreign Affairs and Trade; Industry Science and Resources, as well as agencies such as the Australian Trade Commission (Austrade). Similarly, freight transport logistics is also the concern of various State and Territory departments and agencies. A whole-of-government approach will assist in ensuring that the Action Agenda encompasses the interests of these departments and agencies when addressing transport logistics policy issues.

Industry commitment

The success of any Action Agenda depends on the commitment of industry, and the freight transport logistics industry has demonstrated the kind of commitment required to make this Action Agenda a success. For example, during the past two years, the Commonwealth and State governments have jointly funded the establishment of State-based air and sea freight councils. These councils represent over 400 industry organisations, forming an Australia-wide logistics network that reaches into the heartland of regional Australia.

In addition to this 'grass roots' network, high profile companies involved in the transport of perishable exports have demonstrated their commitment through their voluntary involvement in the Supermarket to Asia's Transport Logistics Working Group (TLWG). The Action Agenda will incorporate much of the work initiated by the TLWG through its Australian Transport Logistics Strategy for Perishable Exports.

Industry and government working together

The Freight Transport Logistics Action Agenda will bring together industry and government to achieve, among other things:

- a seamless logistics system delivering goods on time, in peak condition, at an agreed value;
- the integration of the best available technology to link management systems with the transport infrastructure;
- nationally consistent standards and accepted codes of practice; and
- professional and accredited logistics specialists.

Where to from here?

Action Agendas typically take 12 months to develop. Being responsible for the development of the Australian Freight Transport Logistics Industry Action Agenda, the Department of Transport and Regional Services (DoTRS) has broken the 12 months into 3 four-month-long phases. The first phase will consist of the preparation of a background and issues paper.

The second phase will be initiated by a call for written submissions addressing the issues paper, and will be an intense period of consultation between DoTRS and stakeholders. It is envisaged that during this period, DoTRS officers will visit the States and Territories to conduct workshops based on the outcomes of the written submissions.

The third and final phase will be the preparation and finalisation of the Action Agenda.

For further information, or to express an interest in being part of this process, please contact: Anthony Carlson, tel (02) 6274 6628, tony.carlson@dotrs.gov.au

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issue 24

waterline

SEPTEMBER 2000

bureau of bte transport economics

in brief

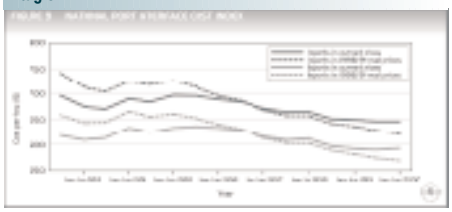
in brief

- The five-port average crane rate was 23.1 containers per hour in the June quarter 2000. This is the highest crane productivity recorded since the series commenced.
- The five-port elapsed labour rate of 30.3 containers per hour, and the ship rate of 37.5 containers per hour, both exceeded the previous quarter's figures.
- Berth availability of 94 per cent in the June quarter equalled the March quarter figure, the highest achieved since the series commenced.
- The removal of the towline charge for towage at Brisbane was the only change to ship-based or cargo-based port interface charges in January–June 2000.
- The introduction of the fuel levy resulted in an increase in road transport charges.
- Compared with 1998/99, the 1999/2000 five-port total container traffic, measured in teus, increased by 14 per cent to 3.14 million teus.

at a glance

graphs

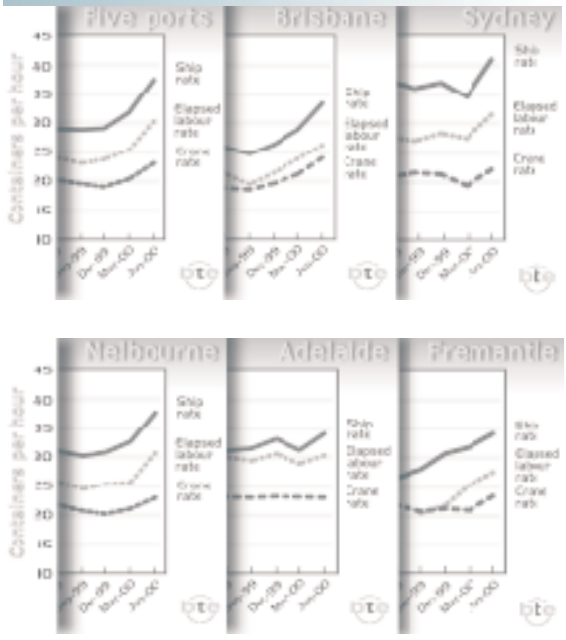
at a glance



at a glance

tables

at a glance



3rd Transport Colloquium

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STEVEDORING PRODUCTIVITY

The BTE has been examining the consistency of definitions used by the various stevedoring operators in collating their performance indicators for *Waterline*. Discrepancies can creep in when there are changes in terminal personnel who collate the data, changes to terminal operators' information systems, or changes in terminal work practices. A number of discrepancies have been noted and are in the process of being rationalised. Some of these definitional adjustments are already in place and the remainder should be bedded down in the next issue of *Waterline*. Broadly, stevedoring performance indicators are only calculated on fully cellular container ships; the elapsed labour rate is calculated by subtracting non-operational delays from the time between labour aboard and labour ashore; the ship rate is calculated by subtracting operational delays from the elapsed rate; and the crane rate is calculated using the ship rate on a per crane basis. In the next issue, following further discussion with container stevedoring operators, the BTE hopes to outline in greater detail the stevedoring productivity definitions used in *Waterline*.

Table 1 presents the June quarter 1998 to June quarter 2000 indicators of stevedoring productivity at the five major Australian container ports, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to June quarter 2000 period. The Brisbane figure is the weighted average for the container terminals operated by P&O Ports, Patrick and Sea-Land. The data for Sydney, Melbourne and Fremantle are weighted averages for the container terminals operated by P&O Ports and Patrick. The Adelaide data is for the Sea-Land container terminal.

Overall, national crane rate productivity in the June quarter 2000, as measured by the five-port average, was higher than in any previous quarter. Additionally, during the June quarter 2000, the elapsed labour rate and the ship rate continued to improve to new highs. Crane intensities (the number of cranes used per ship) also reached new peaks at most terminals during the quarter.

In summary:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 23.1 containers per hour for the June quarter compared with 20.4 in the March quarter 2000;
- the five-port average *elapsed labour rate* (productivity *per ship* based on the time labour is aboard the ship) was 30.3 containers per hour for the June quarter compared with 25.4 in the March quarter 2000; and
- the five-port average *ship rate* (productivity *per ship* while the ship is worked) was 37.5 containers per hour for the June quarter compared with 31.8 in the March quarter 2000.

The average crane rate remained steady at Adelaide and increased at all terminals in other ports. However, the notable increase in the five-port crane rate during the June quarter was largely driven by significant increases in productivity by both operators at Sydney and by one operator at Melbourne. P&O Ports container terminal performance continued to improve at each of its terminals during the June quarter, thus greatly assisting the new highs that have been achieved. The increases in productivity rates achieved by P&O Ports, Patrick and Sea-Land Brisbane confirm comments reported in the media and to BTE over the past few months.

The *Brisbane* (P&O Ports, Patrick, Sea-Land) average crane rate was 24.0 containers per hour in the June quarter, up from 21.2 in the March quarter. The elapsed labour rate of 26.3 containers per hour and the net ship rate of 33.4 containers per hour were both up on the March quarter figures. The average proportion of elapsed time not worked was approximately 21 per cent.

the *five-port* average crane rate was higher than in any *previous quarter*

The *Sydney* (P&O Ports, Patrick) average crane rate was 22.8 containers per hour in the June quarter, up from 18.6 in the March quarter. The Sydney elapsed labour rate of 32.6 containers per hour and the net ship rate of 40.9 containers per hour were both up on the March quarter figures. The average proportion of elapsed time not worked was approximately 20 per cent.

The *Melbourne* (P&O Ports, Patrick) average crane rate was 23.0 containers per hour in the June quarter, up from 21.2 in the March quarter. The Melbourne elapsed labour rate of 30.7 containers per hour and the net ship rate of 37.6 containers per hour were both up on the March quarter figures. The average proportion of elapsed time not worked was approximately 18 per cent.

TABLE I CONTAINER TERMINAL PERFORMANCE INDICATORS—PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00
Five ports									
Ships handled	845	1020	942	942	958	979	933	875	808
Total containers	466 938	493 502	477 744	448 224	469 742	506 696	557 659	517 533	505 802
Crane rate	18.7	19.1	18.9	19.9	20.3	19.6	19.1	20.4	23.1
Elapsed labour rate	20.7[a]	20.7[a]	21.9[a]	23.1[a]	24.0[a]	23.1	23.7	25.4	30.3
Ship rate	24.7	24.2	26.9	28.2	29.0	28.9	29.1	31.8	37.5
Brisbane									
Ships handled	168	192	180	176	193	224	232	219	178
Total containers	58 939	70 209	67 691	61 204	71 008	77 914	84 354	77 992	71 679
Crane rate	17.3	18.2	16.8	18.3	18.9	18.6	19.7	21.2	24.0
Elapsed labour rate	17.1	18.7	19.6	21.2	21.4	19.5	21.5	23.8	26.3
Ship rate	20.2	21.9	22.9	24.7	25.9	24.7	26.4	28.9	33.4
Elapsed time not worked (per cent)	15	15	14	14	18	21	19	18	21
Sydney									
Ships handled	219	267	230	221	243	259	244	221	218
Total containers	130 513	160 007	155 063	142 767	154 062	170 684	195 544	171 164	166 212
Crane rate	16.9	16.5	15.7	17.7	18.2	18.0	16.6	18.6	22.8
Elapsed labour rate	20.2	19.2	18.9	22.6	22.2	23.1	22.5	25.4	32.6
Ship rate	26.2	24.2	24.6	29.5	28.7	29.4	27.6	32.2	40.9
Elapsed time not worked (per cent)	23	21	23	24	23	21	18	21	20
Melbourne									
Ships handled	234	309	274	271	282	278	266	247	217
Total containers	147 122	187 696	170 056	161 894	167 942	183 058	195 723	184 710	178 156
Crane rate	19.2	20.2	21.5	21.5	21.8	20.8	20.3	21.2	23.0
Elapsed labour rate	21.0	21.8	24.3	23.6	25.8	24.5	25.4	25.7	30.7
Ship rate	24.2	24.5	30.7	28.8	31.0	30.2	30.8	32.6	37.6
Elapsed time not worked (per cent)	13	11	21	18	17	19	17	21	18
Adelaide									
Ships handled	66	63	74	73	66	62	62	56	56
Total containers	23 293	21 444	26 319	24 221	24 445	23 969	26 099	21 803	25 245
Crane rate	23.1	23.2	23.2	23.2	23.1	23.0	23.2	23.1	23.0
Elapsed labour rate	30.4	29.0	29.3	28.5	30.0	29.4	30.6	28.9	30.3
Ship rate	31.5	30.3	30.4	30.7	31.1	31.5	33.1	31.2	34.0
Elapsed time not worked (per cent)	3	4	4	7	4	7	7	7	11
Fremantle									
Ships handled	158	189	184	201	174	156	129	132	139
Total containers	47 071	54 155	58 615	58 138	52 285	51 071	55 948	61 864	64 510
Crane rate	21.5	22.2	20.7	21.4	21.7	20.7	21.2	20.9	23.3
Elapsed labour rate	na	na	na	na	na	20.4	21.7	25.3	27.5
Ship rate	23.9	23.8	25.5	25.6	26.6	28.0	30.7	31.8	34.1
Elapsed time not worked (per cent)	na	na	na	na	na	27	29	21	19

na not available
a Four-port average only as Fremantle elapsed rate data were not available.
Notes 1 Data from the Sea-Land terminal at Brisbane are incorporated from the December quarter 1999 onwards.
2 The data in this table are expressed in containers (ie. lifts or moves) per hour and therefore are not directly comparable with the teus per hour data in table 10.
3 Elapsed time not worked is the difference between the ship and elapsed rates as a percentage of the net rate.
Sources Patrick, P&O Ports and Sea-Land.

CONTAINER TERMINAL PRODUCTIVITY

FIGURE 1 FIVE MAJOR PORTS

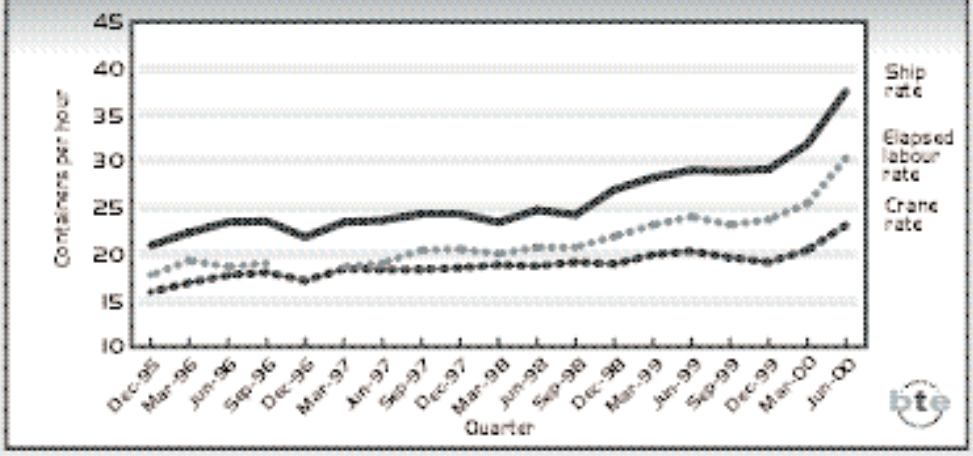


FIGURE 2 BRISBANE

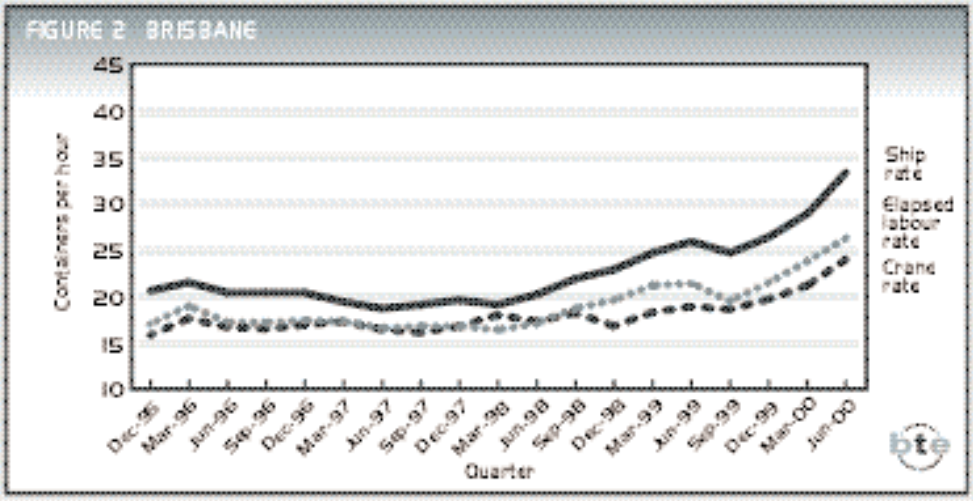
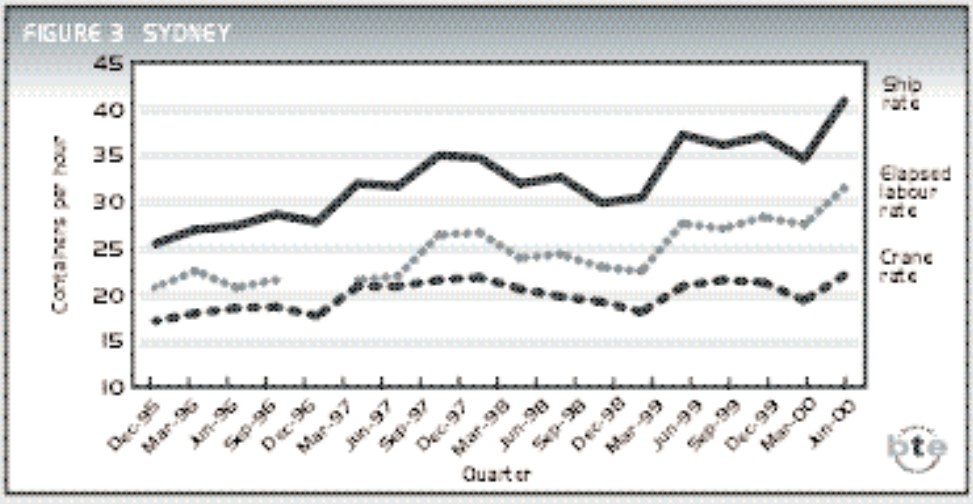


FIGURE 3 SYDNEY



Note *These figures are based on the data contained in table I. Readers should refer to the notes in that table.*

Sources *Patrick, P&O Ports and Sea-Land.*

CONTAINER TERMINAL PRODUCTIVITY

FIGURE 4 MELBOURNE

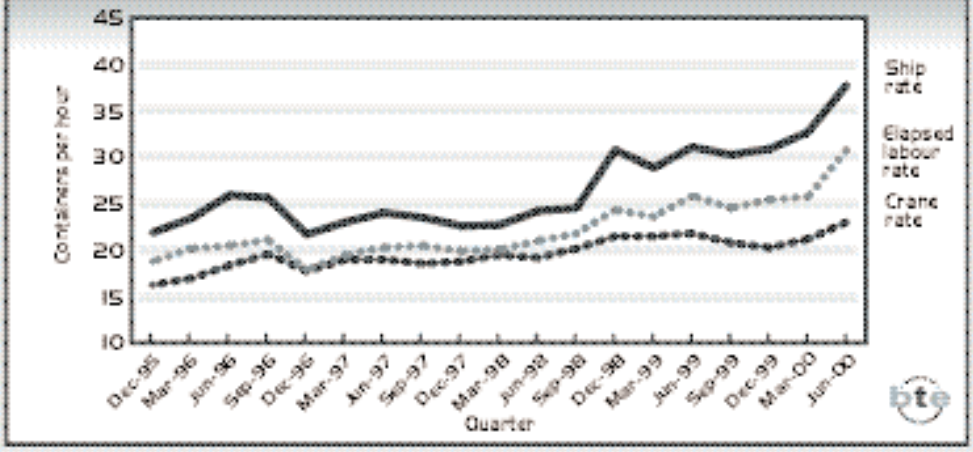


FIGURE 5 ADELAIDE

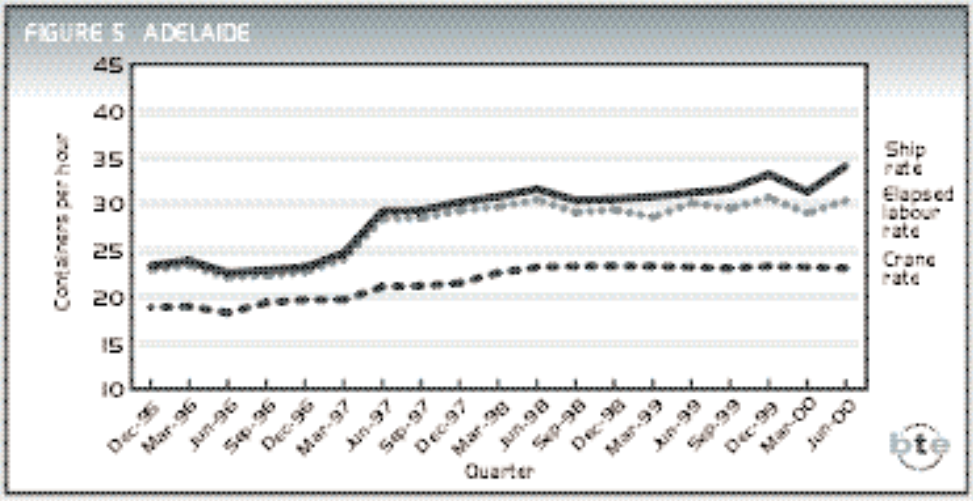
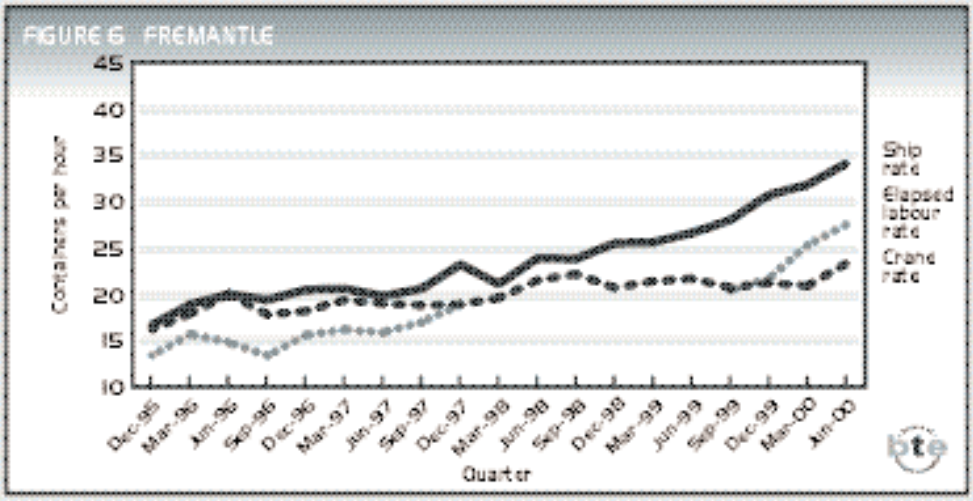


FIGURE 6 FREMANTLE



Note *These figures are based on the data contained in table I. Readers should refer to the notes in that table.*

Sources *Patrick, P&O Ports and Sea-Land.*

The *Adelaide* (Sea-Land) average crane rate was 23.0 containers per hour in the June quarter. The Adelaide crane rate has been fairly constant over the past two years. The elapsed labour rate of 30.3 containers per hour and the net ship rate of 34.0 containers per hour were both up on the March quarter figures. The average proportion of elapsed time not worked was approximately 11 per cent.

The *Fremantle* (P&O Ports, Patrick) average crane rate was 23.3 containers per hour in the June quarter, up from 20.9 containers per hour in the March quarter. The elapsed labour rate of 27.5 containers per hour and the net ship rate of 34.1 containers per hour were both up on the March quarter figure. The average proportion of elapsed time not worked was approximately 19 per cent.

Teus per hour

Table 10 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purpose of long-term historical comparison; they are not directly comparable with the data in table one because indicators based on teus per hour may be affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. They cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the June quarter 2000. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, JUNE QUARTER 2000

(Number of ship calls)

	Delay (hrs)								Total no. of ship calls
Port/operation	0	1	2	3	4	5–10	11–20	>20	
Brisbane									
Berth availability	39	0	0	1	1	1	1	0	43
Pilotage	43	0	0	0	0	0	0	0	43
Towage	43	0	0	0	0	0	0	0	43
Sydney									
Berth availability	78	1	0	0	0	0	0	0	79
Pilotage	79	0	0	0	0	0	0	0	79
Towage	79	0	0	0	0	0	0	0	79
Melbourne									
Berth availability	75	0	3	0	0	3	5	3	89
Pilotage	89	0	0	0	0	0	0	0	89
Towage	89	0	0	0	0	0	0	0	89
Adelaide									
Berth availability	24	0	0	0	0	1	0	0	25
Pilotage	25	0	0	0	0	0	0	0	25
Towage	25	0	0	0	0	0	0	0	25
Fremantle									
Berth availability	37	0	0	0	0	2	1	0	40
Pilotage	40	0	0	0	0	0	0	0	40
Towage	40	0	0	0	0	0	0	0	40
Five ports									
Berth availability	253	1	3	1	1	7	7	3	276
Pilotage	276	0	0	0	0	0	0	0	276
Towage	276	0	0	0	0	0	0	0	276

Note Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns.

Sources Data for a sample of ship calls provided by shipping lines.

The sample for the June quarter 2000 covers 276 ship calls, equivalent to around 34 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 24 per cent at Brisbane to 45 per cent at Adelaide. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Berth availability for the sample of ship calls was 94 per cent in the June quarter 2000. This was the same as the figure that was recorded in the previous quarter. Caution should be used in undertaking inter-port comparisons of the berth availability data, as there is significant variation between ports in sample sizes and ship call patterns.

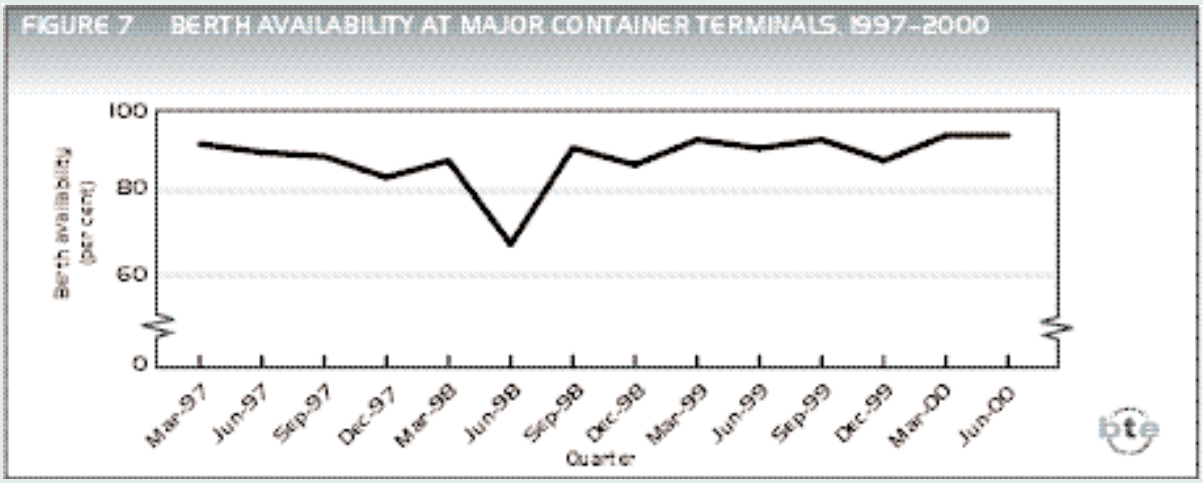
Figure 7 provides information on berth availability since the March quarter 1997. The figure of 94 per cent recorded in the March and June quarters 2000 was the highest level for the berth availability indicator since the series commenced.

Berth availability was 94 per cent

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 13 hours in the June quarter 2000. This was down from the figure of 16 hours that was recorded in the previous quarter.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportion was 100 per cent for each indicator in the June quarter 2000. Performance has been at similar levels since the first data (covering the March quarter 1997) were published in *Waterline*.

FIGURE 7 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997–2000



Sources *Data for a sample of ship calls provided by shipping lines.*

Other waiting time

The five shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

47 per cent of ship calls were affected by *other waiting time incidents* that had a duration of at least one hour

Table 3 summarises the data on other waiting time incidents, which had a duration of at least one hour, in the June quarter 2000. The shipping lines identified a total of 179 incidents (affecting 130 ship calls) for the sample of ship calls over this period. These incidents involved both ship-related and waterfront factors.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The largest single source of other ship waiting time in the June quarter 2000 was the category of awaiting stevedoring labour, which accounted for 31 per cent of total waiting time.

In the June quarter 2000, 47 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. The corresponding proportion in the March quarter 2000 was 51 per cent. The average duration of other waiting time was 7 hours per affected ship call in the June quarter 2000, down slightly from 8 hours per affected ship call in the previous quarter.

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, JUNE QUARTER 2000

(Number of incidents)

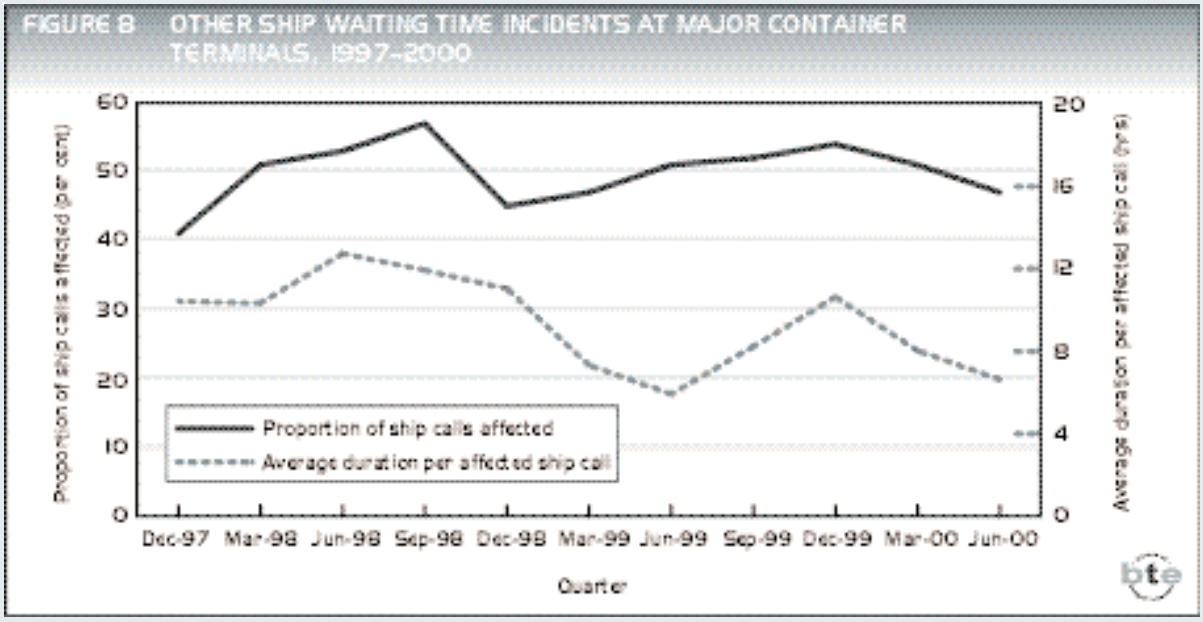
	Ship waiting time (hrs)							Total no. of
Incident type	1	2	3	4	5–10	11–20	>20	incidents
Awaiting labour	6	14	11	3	10	4	3	51
Stevedoring finished early	11	16	2	1	2	0	0	32
Early ship arrival	2	6	3	3	10	1	0	25
Crane breakdown	6	8	4	2	0	0	0	20
Pilot/tug booking not at preferred time	4	7	2	1	1	0	0	15
Late ship arrival	0	0	0	0	2	3	2	7
Ship repairs or maintenance	0	1	1	1	1	2	1	7
Weather or tides	1	1	0	2	3	0	0	7
Stevedoring finished late	0	1	0	0	0	0	0	1
Industrial action	0	0	0	1	0	0	0	1
Other	2	2	2	1	3	1	2	13
Total incidents	32	56	25	15	32	11	8	179[a]

a These incidents affected 130 of the 276 ship calls covered in table 2.

Sources Data for a sample of ship calls provided by shipping lines.

Figure 8 provides information on other ship waiting time over the period since the December quarter 1997. It indicates the proportion of ship calls affected and the average duration of other waiting time per affected ship call in each quarter.

FIGURE 8 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, 1997–2000



Sources *Data for a sample of ship calls provided by shipping lines.*

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals—stevedoring rate and cargo receival. Data are not available for Adelaide.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The main change over the period covered by table 4 was a decline in the stevedoring rate indicator at Sydney.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial measure of one factor that can affect container terminal performance. The only change over the period covered by table 4 was an increase in the cargo receival indicator at Sydney.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, MARCH AND JUNE QUARTERS 2000

(per cent)

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun	Jan–Mar	Apr–Jun
Stevedoring										
Stevedoring rate	na	44	59	47	59	52	na	na	43	39
Cargo receival	na	93	89	85	94	94	na	na	99	99
Ship arrival										
Advice at 24 hrs	na	na	59	61	na	na	51	58	56	54
Advice inside 24 hrs	na	na	98	96	na	na	93	95	88	99

na not available

Sources AAPMA, Patrick and P&O Ports.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice. Brisbane data have not been available for the last two quarters, but are expected to be available again from the September quarter 2000.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation *at 24 hours prior to actual arrival*. Compared with the previous quarter, this indicator increased at Sydney and Adelaide, and was virtually unchanged at Fremantle, in the June quarter 2000.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. This indicator did not change significantly at any of the ports for which data were available in the June quarter 2000.

PORT INTERFACE COST INDEX

The port interface cost index provides a measure of shore-based shipping costs (charges) for containers moved through the Australian mainland capital city ports. Data for July–December 1999 and January–June 2000 are presented in tables 5 to 7. 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. The indicative approach was adopted because of the difficulty of obtaining data on the multitude of factors affecting the prices charged by each service provider, particularly for towage, road transport, and customs brokers' charges.

Brief overview of changes in port interface charges

Other than the removal of the towline charge for towage at Brisbane, there were no other changes to ship-based or cargo-based charges in January–June 2000. The stevedoring charge cannot be updated until the ACCC stevedoring monitoring report is released later in the year. Customs brokers' fees remained largely constant, and the introduction of the fuel levy resulted in an overall increase in road transport charges. Looking ahead, the introduction of the GST is expected to cause significant increases across most areas in the July–December port interface cost index which will be published in *Waterline* at the end of the first quarter 2001.

Port and related charges

Table 5 provides the parameters used to determine the port and related charges in table 6. These parameters relate to a representative port call by a container ship (Lloyd's ship classification UCC). The representative ship was selected from the ship-size range with the most port calls by UCC-type ships. The ship-size range of 15 000 to 20 000 GRT has had the most port calls at each port since monitoring of port charges commenced in 1992. The other cost parameters are then determined by taking the mean of all port calls in the range that contains the representative ship.

It is important to directly connect the mean number of teus exchanged per port call with the size of the representative ship. This is because most port and related charges, particularly towage and tonnage charges, depend on the size of the ship. However, shipping economics dictate that the larger the ship being used to transport the cargo, the greater the tendency of ship operators to exchange higher volumes of cargo per port call. As a result, the per unit (in this case teu) cost of exchanging cargo at a particular port remains

TABLE 5 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 1999/2000

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000
Vessel size										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
Teus exchanged[a]										
Total	443	484	930	854	1080	1042	619	630	400	620
Loaded	353	370	769	667	908	864	493	486	327	472
Empty	90	114	161	187	172	178	126	144	73	148
Loaded inwards	171	169	492	423	492	454	191	192	179	236
Loaded outwards	182	201	277	244	416	410	302	294	148	235
Ship call parameters[a]										
Number of port calls	4	4	3	3	4	3	6	5	7	4
Elapsed berth time (hrs)	24	20	48	38	42	39	22	24	21	22

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

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

roughly the same for each port call regardless of the size of the ship. It is for this reason that comparative port charge analyses that keep the cargo exchange constant while varying the ship size are misleading. A discussion of this, in relation to the port interface cost index, can be found in *Waterline 4*, October 1995, pp. 9–13. That article also demonstrates that the BTE's port interface cost index is a reasonable approximation of port interface costs for most container movements across the Australian mainland capital city ports.

Table 6 provides the port and related charges at the five mainland capital city ports for July–December 1999 and January–June 2000. Port and related charges comprise ship-based charges and cargo-based charges.

TABLE 6 PORT AND RELATED CHARGES, 1999/2000

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000
Ship-based charges ($/teu)										
Conservancy	5.13	4.70	-	-	-	-	1.39	1.91	-	-
Tonnage	-	-	7.22	7.86	4.16	4.31	6.84	6.94	6.33	4.68
Pilotage	11.57	10.61	3.38	3.68	5.08	5.26	3.79	3.73	5.23	3.37
Towage	17.12	15.32	7.88	8.58	6.37	6.69	19.86	19.52	12.31	7.94
Mooring, unmooring	3.86	3.54	3.38	3.69	0.87	0.90	-	-	2.75	1.78
Berth hire[a]	-	-	-	-	9.41	9.66	-	-	-	-
Total[b]	37.68	34.17	21.86	23.81	25.89	26.14	31.88	32.10	26.62	17.17
Cargo-based charges ($/teu)										
Wharfage										
Imports	26.00	26.00	60.00	60.00	25.90	25.90	53.00	53.00	47.30	47.30
Exports	26.00	26.00	45.00	45.00	25.90	25.90	53.00	53.00	47.30	47.30
Harbour dues	42.00	42.00	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	13.90	13.90
Total port and related charges ($/teu)[b]										
Loaded imports	106	102	82	84	52	52	85	85	88	78
Loaded exports	106	102	67	69	52	52	85	85	88	78
Charges per ship visit ($/visit)										
Total ship-based charges	16702	16522	20334	20334	27959	27242	19745	20228	10641	10641
Empty teus[c]	1283	1625	-	-	-	-	-	-	562	1140

- not applicable

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

b Components may not sum to totals due to rounding.

c 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 5.

Sources BTE 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.

Ship-based charges

Compared with July–December 1999, the only actual change to ship-based charges in January–June 2000 was the removal of the towline charge for towage at Brisbane.

All other apparent changes to ship-based charges resulted from changes to the parameters (viz. average teu-exchange, average elapsed berth time, average number of port calls) on which the ship-based charges are calculated. On a teu basis, the overall changes in ship-based charges in January–June 2000 were:

- at *Brisbane*—a 9 per cent fall in ship-based charges per teu, resulting from a 9 per cent increase in the average teu-exchange;
- at *Sydney*—a 9 per cent increase in ship-based charges per teu, resulting from an 8 per cent fall in the average teu-exchange;
- at *Melbourne*—a 1 per cent increase in ship-based charges per teu, resulting from a 3 per cent fall in average teu-exchange, partially countermanded by the 7 per cent decrease in the elapsed berth time which caused a decrease in the berth hire charge;
- at *Adelaide*—a 1 per cent increase in ship-based charges per teu, resulting from a 2 per cent increase in the tonnage charge caused by the 9 per cent increase in the elapsed berth time, and partially countermanded by a 2 per cent increase in the average teu-exchange;
- at *Fremantle*—a 35 per cent fall in ship-based charges per teu, resulting from a 55 per cent increase in average teu-exchange. (On the basis of port-wide all-inclusive container figures in the non-financial indicators table on page 15, Fremantle experienced an unusually high exchange in empty containers and full export containers during January–June 2000.)

Fremantle experienced an unusually high container throughput

While caution should always be used when making port comparisons on a per teu basis, Fremantle has overtaken Sydney to become the lowest-cost port for ship-based charges. This is significant from a cargo owner's point of view. From the point of view of ship operators using ships similar to the representative ship in table 5, Fremantle continues to remain the lowest cost port for ship-based charges on a per ship-visit basis.

Cargo-based charges

There were no changes in cargo-based charges in January–June 2000.

Changes in total port and related charges per loaded teu

Total port and related charges per loaded teu, for January–June 2000:

- at *Brisbane*—fell by about 3 per cent, solely due to the 9 per cent fall in the ship-based component;
- at *Sydney*—increased by about 2 per cent for imports and 3 per cent for exports, solely due to the 9 per cent increase in the ship-based component;
- at *Melbourne*—increased by about half of one per cent, solely due to the one per cent increase in the ship-based component;
- at *Adelaide*—remained almost constant; and
- at *Fremantle*—fell by about 11 per cent, solely due to the 35 per cent fall in the ship-based component.

Stevedoring charges per teu

The stevedoring charges used in this issue of *Waterline* are those published in the most recent ACCC report on stevedoring prices (October 1999). As these prices refer to the first half of 1999, they will need to be revised when the ACCC publishes its results for 1999/2000.

Land-based charges per teu

The average charges for customs brokers' fees and road transport charges for the July–December 1999 and January–June 2000 port interface cost index are included in table 7. These charges are based on data provided by approximately 40 customs brokers and 50 road transport operators. Customs brokers' fees for imports are higher than fees for exports, reflecting the more complex clearance procedures for import containers.

During January–June 2000 there was a 2 per cent average fall in customs brokers' fees for imports at Sydney and at Fremantle. No other changes were recorded.

Road transport charges increased at all five port cities. The increase was mostly a result of the introduction of the fuel levy. A few operators were able to absorb the fuel levy, but most companies had to pass on the increase to their clients. Road transport charges increased by about 3 per cent at Brisbane, Melbourne and Adelaide; by about 2 per cent at Fremantle; and by about one per cent at Sydney. One of the parameters used to estimate road transport charges is the time taken to move containers from/to the wharf to/from the customer's warehouse. Both distance and traffic congestion impact on this parameter and therefore, to some extent, help explain the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

TABLE 7 PORT INTERFACE COSTS, 1999/2000

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000	Jul–Dec 1999	Jan–Jun 2000
Import										
Ship-based charges	38	34	22	24	26	26	32	32	27	17
Cargo-based charges	68	68	60	60	26	26	53	53	61	61
Stevedoring[p]	181	181	181	181	181	181	181	181	181	181
Customs brokers fees	123	123	152	149	138	138	132	132	141	138
Road transport charges	185	190	293	296	252	260	169	173	199	203
Import total[a]	596	597	707	709	623	631	566	571	609	600
Export										
Ship-based charges	38	34	22	24	26	26	32	32	27	17
Cargo-based charges	68	68	45	45	26	26	53	53	61	61
Stevedoring[p]	181	181	181	181	181	181	181	181	181	181
Customs brokers fees	77	77	111	111	89	89	73	73	67	67
Road transport charges	185	190	293	296	252	260	169	173	199	203
Export total[a]	549	550	651	656	574	582	508	513	535	529

p provisional pending updating of stevedoring charge by the ACCC.

a Components may not sum to totals due to rounding.

Notes 1 Based on parameters described in table 5.

2 Waterline data on customs brokers fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.

3 The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTE 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; and stevedoring charge data supplied by the ACCC.

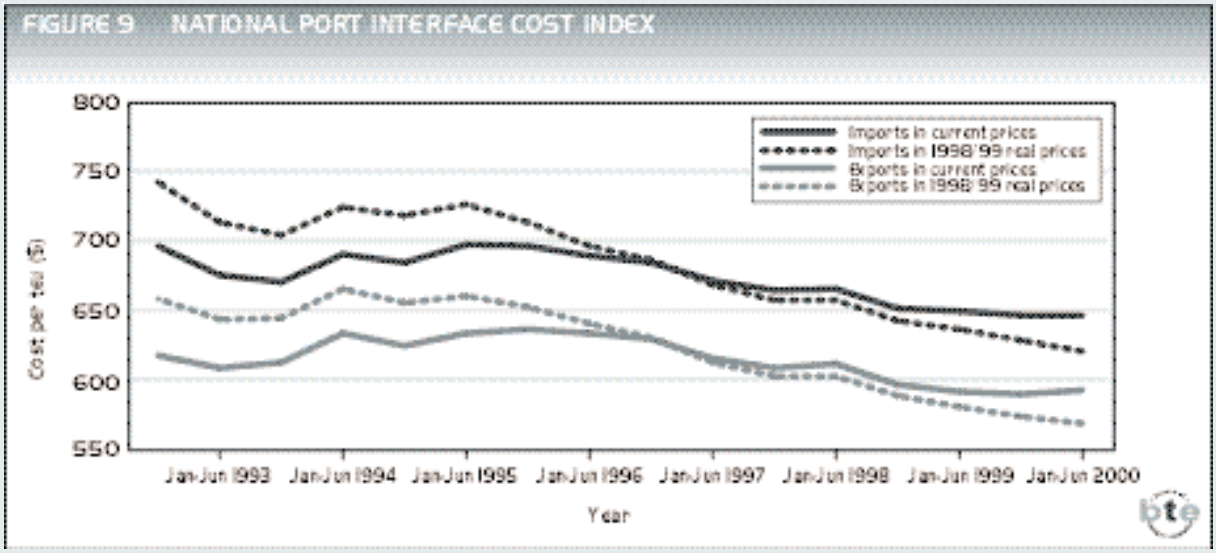
Indices for individual ports

Table 7 indicates that, between July–December 1999 and January–June 2000, there were changes in total port interface costs ranging from -1.5 per cent to +1.4 per cent across the five ports. However, this should be interpreted with caution given the provisional nature of the reported stevedoring charges. Even if stevedoring charges did not change during January–June 2000, care should still be taken in making inter-port comparisons of port interface costs. The use of a single stevedoring charge for all ports reflects the scope of the available information which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

National index

Figure 9 provides the national port interface cost index back to 1992. In overall terms, there was little movement in the national index between July–December 1999 and January–June 2000. In current prices, national import charges remained steady at $646 per teu, while export charges increased by 0.5 per cent to $592 per teu. In real prices (using ABS chain volume statistics to calculate the deflator), national import charges fell by 1.3 per cent per teu, and export charges fell 0.8 per cent per teu.

FIGURE 9 NATIONAL PORT INTERFACE COST INDEX



Sources *BTE 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 supplied by the ACCC; and ABS gross non-farm product deflator data.*

PORT PERFORMANCE—NON-FINANCIAL

The non-financial indicators include throughput across all wharves at each of the five major container ports. The July–December 1999 and January–June 2000 non-financial indicators for the five mainland capital city ports are presented in table 8. Cargoes in Australia experience seasonal fluctuations; for instance, container throughput tends to be significantly higher during July–December than during the preceding January–June. Therefore, comparisons in the article below generally focus on the earlier corresponding season (in this instance January–June 1999) in preference to the immediately preceding season.

Cargo throughput

Total cargo throughput at the five ports was 48.3 million tonnes for January–June 2000, compared with 47.8 million tonnes for January–June 1999, and 48.7 million tonnes for July–December 1999. Compared with the corresponding January–June period of the previous year, total cargo throughput increased at Brisbane (11 per cent), Sydney (3 per cent), Melbourne (one per cent) and Adelaide (15 per cent). It declined at Fremantle (13 per cent). Overall this resulted in an increase of one per cent in total cargo throughput for the five ports compared with January–June 1999, and a decrease of three-quarters of one per cent compared with July–December 1999.

Non-containerised general cargo throughput at the five ports was 2.28 million tonnes for January–June 2000, compared with 2.24 million tonnes for January–June 1999 (an increase of 1.4 per cent), and 2.31 million tonnes for July–December 1999 (a decrease of 1.3 per cent).

Total container traffic throughput for the five ports, measured in teus, was 1.57 million teus for January–June 2000, compared with 1.36 million teus for January–June 1999 (an increase of 16 per cent), and similar to July–December 1999 (an increase of 0.3 per cent). Compared with January–June 1999, throughput of loaded teus increased by 13 per cent, with loaded imports increasing by 14 per cent and loaded exports increasing 12 per cent.

Compared with 1998/99, the annual 1999/2000 five-port total container traffic, measured in teus, increased by 14 per cent to 3.14 million teus.

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TABLE 8 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 1999/2000

Indicator	Brisbane Jul–Dec 1999	Brisbane Jan–Jun 2000	Sydney Jul–Dec 1999	Sydney Jan–Jun 2000	Melbourne Jul–Dec 1999	Melbourne Jan–Jun 2000	Adelaide Jul–Dec 1999	Adelaide Jan–Jun 2000	Fremantle Jul–Dec 1999	Fremantle Jan–Jun 2000	Five ports[d] Jul–Dec 1999	Five ports[d] Jan–Jun 2000
Total cargo throughput ('000 tonnes)	11 190	11 859	12 543	11 811	11 120	10 846	3 112	3 604	10 698	10 174	48 663	48 294
Non-containerised general cargo ('000 tonnes)[a]	328[r]	330	375	348	1 093	1 092	167	168	342	338	2 305	2 276
Containerised cargo (teus exchanged)												
Full import	80 820	77 990	275 821	242 228	295 480	278 325	17 378	18 049	60 132	62 132	729 631	678 724
Empty import	27 606	32 583	11 319	8 312	42 995	41 992	6 877	9 325	11 960	21 682	100 757	113 894
Full export	85 819	92 838	155 479	139 587	249 443	251 730	27 585	27 581	49 716	61 863	567 962	573 599
Empty export	14 652	20 308	78 921	98 842	60 374	67 456	4 594	4 197	12 480	17 398	171 021	208 261
TOTAL	208 897	223 719	521 540	488 969	648 292	639 503	56 354	59 152	134 288	163 075	1 569 371	1 574 418
Average total employment[b]	220	234	189	188	80	80	156	151	167	169	812	822
Port turnaround time (hrs)[c]												
Median result	32	30	43	35	43	39	21	19	25	23	-	-
95th percentile	60	66	84	67	85	71	43	35	50	49	-	-

\- not applicable
r revised
a Excludes bulk cargoes.
b Comparisons between ports are not appropriate because each port authority/corporation has a different structure.
c Port turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate because each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.
d Components may not sum to totals due to rounding.

Source AAPMA.

TABLE 9 TEU THROUGHPUT AT THE FIVE MAJOR AUSTRALIAN PORTS, 1995–2000

	teus											per cent		
	Jan–Jun 1995	Jul–Dec 1995	Jan–Jun 1996	Jul–Dec 1996	Jan–Jun 1997	Jul–Dec 1997	Jan–Jun 1998	Jul–Dec 1998	Jan–Jun 1999	Jul–Dec 1999	Jan–Jun 2000	Change in teu throughput over five years	Market share Jan–Jun 1995	Market share Jan–Jun 2000
Brisbane														
Full imports	39 009	37 075	39 286	44 765	43 883	55 283	57 082	62 980	61 369	80 820	77 990	100	8.8	11.5
Empty imports	16 850	22 435	24 942	22 918	23 720	26 982	22 450	24 630	28 376	27 606	32 583	93	24.6	28.6
Full exports	50 650	54 646	55 527	60 295	61 627	67 356	66 838	70 168	82 906	85 819	92 838	83	13.3	16.2
Empty exports	11 212	8 037	7 491	7 774	7 660	10 165	11 412	14 388	12 886	14 652	20 308	81	9.5	9.8
Total teus	117 721	122 193	127 246	135 752	136 880	159 786	157 782	172 166	185 537	208 897	223 719	90	11.6	14.2
Sydney														
Full imports	166 140	178 643	167 875	192 764	180 102	214 301	189 423	226 977	218 094	275 821	242 228	46	37.3	35.7
Empty imports	6 910	7 583	10 170	10 304	9 419	8 165	7 594	9 159	13 006	11 319	8 312	20	10.1	7.3
Full exports	97 353	109 955	107 105	116 017	115 636	133 463	116 244	129 669	126 359	155 479	139 587	43	25.6	24.3
Empty exports	55 339	51 574	51 869	54 032	52 172	62 252	66 857	84 751	70 565	78 921	98 842	79	46.8	47.5
Total teus	325 742	347 755	336 959	373 117	357 329	418 181	380 028	450 556	428 024	521 540	488 969	50	32.2	31.1
Melbourne														
Full imports	187 394	202 013	193 089	222 273	209 843	243 319	217 602	254 315	241 834	295 480	278 325	49	42.0	41.0
Empty imports	29 431	31 168	36 082	37 955	34 265	39 124	39 878	35 220	38 766	42 995	41 992	43	43.0	35.9
Full exports	176 400	185 724	186 167	201 630	200 601	213 186	197 025	215 915	220 387	249 443	251 730	43	46.3	43.9
Empty exports	41 681	45 015	43 884	42 350	35 477	49 080	50 596	62 293	52 431	60 374	67 456	62	35.2	32.4
Total teus	434 906	463 920	459 222	504 208	480 186	544 709	496 101	567 743	553 418	648 292	639 503	47	42.9	40.6
Adelaide														
Full imports	9 617	10291	9 004	12 144	13 226	16 261	19 454	19 744	19 280	17 378	18 049	88	2.2	2.7
Empty imports	5 856	5 155	6 030	8 239	5 866	8 461	7 855	8 209	8 552	6 877	9 325	59	8.5	8.2
Full exports	16 889	16 824	19 167	22 959	22 895	24 630	24 730	25 365	28 271	27 565	27 581	63	4.4	4.8
Empty exports	1 552	1 317	1 567	1 668	1 509	2 939	3 582	5 781	5 384	4 594	4 197	170	1.3	2.0
Total teus	33 914	33 597	35 768	45 010	43 487	52 291	55 621	59 099	61 487	56 354	59 152	74	3.3	3.8
Fremantle														
Full imports	43 546	42 041	41 908	45 420	44 125	54 848	53 984	58 041	53 309	60 132	62 132	43	9.8	9.2
Empty imports	9 466	7 883	12 165	9 603	9 318	10 474	11 134	15 313	14 230	11 960	21 682	129	13.8	19.0
Full exports	39 389	38 980	44 661	41 275	43 079	46 483	48 819	51 833	53 159	49 716	61 863	57	10.3	10.8
Empty exports	8 483	8 048	6 994	8 942	7 802	10 962	14 098	16 265	13 607	12 480	17 398	105	7.2	8.4
Total teus	100 884	96 952	105 728	105 240	104 324	122 767	128 035	141 392	134 305	134 288	163 075	62	10.0	10.4
Five Ports														
Full imports	445 706	470 063	451 162	517 366	491 179	584 012	537 545	622 057	593 886	729 631	678 724	52		
Empty imports	68 513	74 224	89 389	89 019	82 588	93 206	79 821	92 531	102 930	100 757	113 894	66		
Full exports	380 681	406 129	412 627	442 176	443 838	485 118	453 656	492 950	511 082	567 962	573 599	51		
Empty exports	118 267	113 991	111 745	114 766	104 601	135 398	146 545	183 418	154 873	171 021	208 201	76		
Total teus	1 013 167	1 064 407	1 064 923	1 163 327	1 122 206	1 297 734	1 217 567	1 390 956	1 362 771	1 569 371	1 574 418	55		

Source AAPMA data in Waterline, various issues.

Cargo throughput series

Teu throughputs covering the past five years are presented in table 9. Over this period, five-port teu throughputs increased by more than 50 per cent in all category breakdowns. The last two columns in the table indicate the market share in teu traffic for each of the five ports for January–June 1995 and for January–June 2000. Overall, the smaller ports of Brisbane, Adelaide and Fremantle have experienced slight gains in market share at the expense of the larger ports of Sydney and Melbourne.

Employment

Table 8 indicates that average employment at the five mainland capital city port authorities/corporations rose by one per cent in the January–June 2000 period compared with the previous half-year. It declined by 14 per cent compared with July–December 1996, the earliest comparable period since BTE monitoring commenced. Prior to this period, major reforms throughout the Australian port authority sector were at various stages at each of the ports.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BTE	Bureau of Transport Economics
GRT	Gross registered tonnage
GST	Goods and services tax
NRT	Net registered tonnage
teu	Twenty-foot equivalent unit
UCC	Container ship
viz.	namely

BTE TRANSPORT COLLOQUIUM 2000

A BETTER TRANSPORT SYSTEM FOR AUSTRALIA: THE CONTRIBUTION OF RESEARCH AND ANALYSIS

Held over 3 days from 27 to 29 November 2000

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More details

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TABLE 10 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS— PRODUCTIVITY IN TEUS PER HOUR

	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00
Five ports																	
Ships handled	827	871	907	865	891	907	963	909	845	1020	942	942	958	979	933	875	808
Total teus	440 098	497 140	519 206	441 697	483 372	549 247	585 474	527 881	514 409	633 107	612 019	573 444	602 501	660 593	726 590	678 046	666 967
Crane rate	21.3	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5	25.9	25.4	24.8	26.6	30.4
Elapsed rate	22.6	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na	na	na	30.1	30.8	33.3	40.0
Net rate	28.5	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2	37.3	37.7	37.8	41.7	49.5
Brisbane																	
Ships handled	133	140	141	156	164	162	177	170	168	192	180	176	193	224	232	219	178
Total teus	51 008	66 115	62 904	47 471	65 572	73 184	71 043	58 857	74 023	87 373	84 200	75 444	88 311	98 944	106 096	97 431	90 932
Crane rate	19.9	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6	23.4	23.3	24.6	26.4	30.5
Elapsed rate	20.5	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3	26.7	24.7	27.0	29.8	33.4
Net rate	24.3	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6	32.2	31.2	33.1	36.1	42.3
Sydney																	
Ships handled	216	228	249	251	249	243	266	238	219	267	230	221	243	259	244	221	218
Total teus	148 290	156 344	174 982	158 323	167 705	183 978	201 535	176 496	168 234	209 619	203 042	187 287	203 536	226 784	260 927	229 014	224 445
Crane rate	19.9	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4	23.2	24.0	23.7	22.1	24.8	30.9
Elapsed rate	22.1	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6	29.3	30.6	30.1	34.0	44.1
Net rate	27.9	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3	38.8	38.0	38.9	36.8	43.0	55.4
Melbourne																	
Ships handled	262	274	282	230	249	268	281	276	234	369	274	271	282	278	266	247	217
Total teus	170 884	203 371	202 376	162 156	177 070	208 200	223 465	207 346	185 803	242 456	219 549	206 727	215 379	241 775	257 147	243 277	236 306
Crane rate	22.3	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5	28.1	27.4	26.5	27.9	30.3
Elapsed rate	25.0	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2	33.1	32.4	33.4	33.8	40.5
Net rate	31.7	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9	39.7	39.9	40.4	43.0	49.4
Adelaide																	
Ships handled	63	70	74	69	65	68	66	60	66	63	74	73	66	62	62	56	56
Total teus	18 803	20 519	23 351	21 963	20 933	25 982	25 188	22 260	27 975	25 493	32 556	31 326	29 569	28 271	30 597	27 736	30 551
Crane rate	21.5	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0	27.9	27.2	27.2	29.4	27.8
Elapsed rate	26.1	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8	36.3	34.7	35.9	36.8	36.7
Net rate	26.7	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7	37.6	37.2	38.8	39.7	41.1
Fremantle																	
Ships handled	153	159	161	159	164	166	173	165	158	189	184	201	174	156	129	132	139
Total teus	51 113	50 791	55 593	51 784	52 092	57 903	64 243	62 922	58 374	68 166	72 672	72 660	65 706	64 819	71 823	80 588	84 733
Crane rate	23.4	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6	27.3	26.1	27.2	27.4	30.5
Elapsed rate	17.6	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na	na	25.8	27.9	33.0	36.0
Net rate	23.5	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0	33.4	35.3	38.8	41.6	44.7

na not available

Notes 1 Data from the Sea-Land terminal at Brisbane are incorporated from the December quarter 1999 onwards.

2 Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator s information systems.

3 For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.

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acknowledgements

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issue 25

waterline

DECEMBER 2000

bureau of bte transport economics

in brief

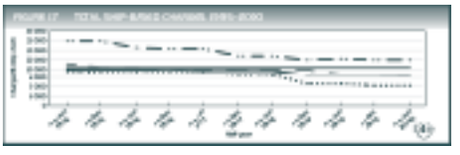
in brief

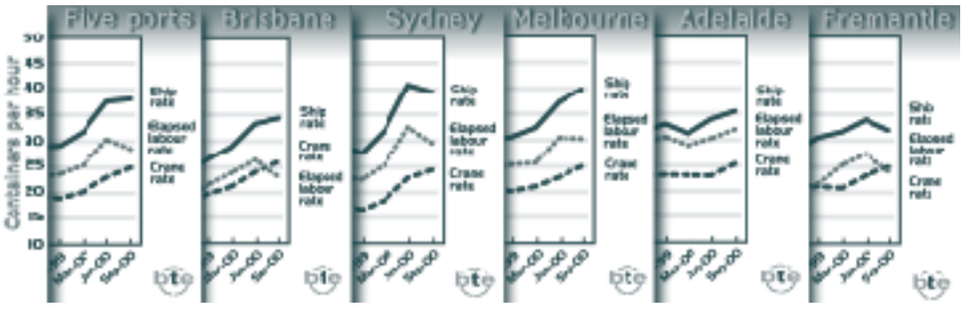
- The five-port average crane rate was 24.9 containers per hour in the September quarter 2000. This is the highest crane productivity recorded since the series commenced.
- The five-port elapsed labour rate of 28.5 containers per hour was down on the previous quarter's figure, while the ship rate of 38.0 containers per hour was slightly up.
- Berth availability of 95 per cent in the September quarter was the highest achieved since the series commenced.
- In 1999/2000, the overall tonnage of cargo moved under coastal permits increased by 15 per cent compared with 1998/1999.
- Over the past five years, ship-based charges have fallen by 17 per cent in Brisbane, by 25 per cent in Sydney, by 28 per cent in Melbourne, and by 44 per cent in Fremantle. Adelaide ship-based charges have remained unchanged.

at a glance

at a glance

graphs





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STEVEDORING PRODUCTIVITY

Table 1 presents the September quarter 1998 to September quarter 2000 indicators of stevedoring productivity at the five major Australian container ports, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to September quarter 2000 period. The Brisbane figure is the weighted average for the container terminals operated by P&O Ports, Patrick and Sea-Land. The data for Sydney, Melbourne and Fremantle are weighted averages for the container terminals operated by P&O Ports and Patrick. The Adelaide data is for the Sea-Land container terminal.

Overall, national crane rate productivity in the September quarter 2000, as measured by the five-port average, exceeded the rate attained in any previous quarter. The ship rate increased marginally to a new high, while the elapsed labour rate declined from the June quarter's peak. Crane intensities (the number of cranes used per ship) fell at all five ports during the quarter.

In summary:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 24.9 containers per hour for the September quarter, compared with 23.1 in the June quarter 2000;
- the five-port average *elapsed labour rate* (productivity *per ship* based on the time labour is aboard the ship) was 28.5 containers per hour for the September quarter, compared with 30.3 in the June quarter 2000; and
- the five-port average *ship rate* (productivity *per ship* while the ship is worked) was 38.0 containers per hour for the September quarter, compared with 37.5 in the June quarter 2000.

Compared with the June quarter, the September quarter crane rate increased at eight terminals and remained steady at two.

The *Brisbane* (P&O Ports, Patrick, Sea-Land) average crane rate was 25.8 containers per hour in the September quarter, up from 24.0 in the June quarter. The elapsed labour rate of 23.3 containers per hour was down, while the ship rate of 34.9 containers per hour was up, on the June quarter figures. The average proportion of elapsed time not worked was approximately 33 per cent.

The *Sydney* (P&O Ports, Patrick) average crane rate was 24.3 containers per hour in the September quarter, up from 22.8 in the June quarter. The Sydney elapsed labour rate of 29.6 containers per hour and the ship rate of 39.5 containers per hour were both down on the June quarter figures. The average proportion of elapsed time not worked was approximately 25 per cent.

The *Melbourne* (P&O Ports, Patrick) average crane rate was 25.0 containers per hour in the September quarter, up from 23.0 in the June quarter. Compared with the June quarter figures, the elapsed labour rate of 30.5 containers per hour was marginally down, while the ship rate of 40.1 containers per hour was up. The average proportion of elapsed time not worked was approximately 24 per cent.

The *Adelaide* (Sea-Land) average crane rate was 25.3 containers per hour in the September quarter, up from 23.0 in the June quarter. The elapsed labour rate of 32.1 containers per hour and the ship rate of 35.5 containers per hour were both up on the June quarter figures. The average proportion of elapsed time not worked was approximately 10 per cent.

The *Fremantle* (P&O Ports, Patrick) average crane rate was 24.9 containers per hour in the September quarter, up from 23.3 containers per hour in the June quarter. The elapsed labour rate of 24.1 containers per hour and the ship rate of 32.1 containers per hour were down on the June quarter figures. The average proportion of elapsed time not worked was approximately 25 per cent.

Teus per hour

Table 6 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purpose of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.

Stevedoring productivity definitions

- Stevedoring performance indicators are calculated for cellular container ships;
- Elapsed labour time is the time between labour aboard and labour ashore, less non-operational delays;

TABLE I CONTAINER TERMINAL PERFORMANCE INDICATORS— PRODUCTIVITY IN CONTAINERS PER HOUR

	Quarter								
Port/indicator	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00
Five ports									
Ships handled	1020	942	942	958	979	933	875	808	840
Total containers	493 502	477 744	448 224	469 742	506 696	557 659	517 533	505 802	531 700
Crane rate	19.1	18.9	19.9	20.3	19.6	19.1	20.4	23.1	24.9
Elapsed labour rate	20.7 [a]	21.9 [a]	23.1 [a]	24.0 [a]	23.1	23.7	25.4	30.3	28.5
Ship rate	24.2	26.9	28.2	29.0	28.9	29.1	31.8	37.5	38.0
Brisbane									
Ships handled	192	180	176	193	224	232	219	178	187
Total containers	70 200	67 691	61 204	71 008	77 914	84 354	77 992	71 679	80 366
Crane rate	18.2	16.8	18.3	18.9	18.6	19.7	21.2	24.0	25.8
Elapsed labour rate	18.7	19.6	21.2	21.4	19.5	21.5	23.8	26.3	23.3
Ship rate	21.9	22.9	24.7	25.9	24.7	26.4	28.9	33.4	34.9
Elapsed time not worked (per cent)	15	14	14	18	21	19	18	21	33
Sydney									
Ships handled	267	230	221	243	259	244	221	218	223
Total containers	160007	155063	142767	154062	170684	195 544	171 164	166 212	173 988
Crane rate	16.5	15.7	17.7	18.2	18.0	16.6	18.6	22.8	24.3
Elapsed labour rate	19.2	18.9	22.6	22.2	23.1	22.5	25.4	32.6	29.6
Ship rate	24.2	24.6	29.5	28.7	29.4	27.6	32.2	40.9	39.5
Elapsed time not worked (per cent)	21	23	24	23	21	18	21	20	25
Melbourne									
Ships handled	309	274	271	282	278	266	247	217	227
Total containers	187 696	170 056	161 894	167 942	183 058	195 723	184 710	178 156	189 306
Crane rate	20.2	21.5	21.5	21.8	20.8	20.3	21.2	23.0	25.0
Elapsed labour rate	21.8	24.3	23.6	25.8	24.5	25.4	25.7	30.7	30.5
Ship rate	24.5	30.7	28.8	31.0	30.2	30.8	32.6	37.6	40.1
Elapsed time not worked (per cent)	11	21	18	17	19	17	21	18	24
Adelaide									
Ships handled	63	74	73	66	62	62	56	56	62
Total containers	21 444	26 319	24 221	24 445	23 969	26 090	21 803	25 245	26 836
Crane rate	23.2	23.2	23.2	23.1	23.0	23.2	23.1	23.0	25.3
Elapsed labour rate	29.0	29.3	28.5	30.0	29.4	30.6	28.9	30.3	32.1
Ship rate	30.3	30.4	30.7	31.1	31.5	33.1	31.2	34.0	35.5
Elapsed time not worked (per cent)	4	4	7	4	7	7	7	11	10
Fremantle									
Ships handled	189	184	201	174	156	129	132	139	141
Total containers	54 155	58 615	58 138	52 285	51 071	55 948	61 864	64 510	61 204
Crane rate	22.2	20.7	21.4	21.7	20.7	21.2	20.9	23.3	24.9
Elapsed labour rate	na	na	na	na	20.4	21.7	25.3	27.5	24.1
Ship rate	23.8	25.5	25.6	26.6	28.0	30.7	31.8	34.1	32.1
Elapsed time not worked (per cent)	na	na	na	na	27	29	21	19	25

na not available

a. Four-port average only as Fremantle elapsed rate data were not available.

Notes 1. Data from the Sea-Land terminal at Brisbane are incorporated from the December quarter 1999 onwards.

2. The data in this table are expressed in containers (ie. lifts or moves) per hour and therefore are not directly comparable with the teus per hour data in table 6.

3. Elapsed time not worked is the difference between ship rate and elapsed rate as a percentage of ship rate.

Sources Patrick, P&O Ports and Sea-Land.

- Ship time is the elapsed labour time less operational delays; and
- Crane time is ship time divided by crane intensity.

As soon as the aligned set of definitions has been ratified by all container stevedoring operators, the BTE will publish a comprehensive list of definitions in *Waterline*.

CONTAINER TERMINAL PRODUCTIVITY

FIGURE 1 FIVE MAJOR PORTS

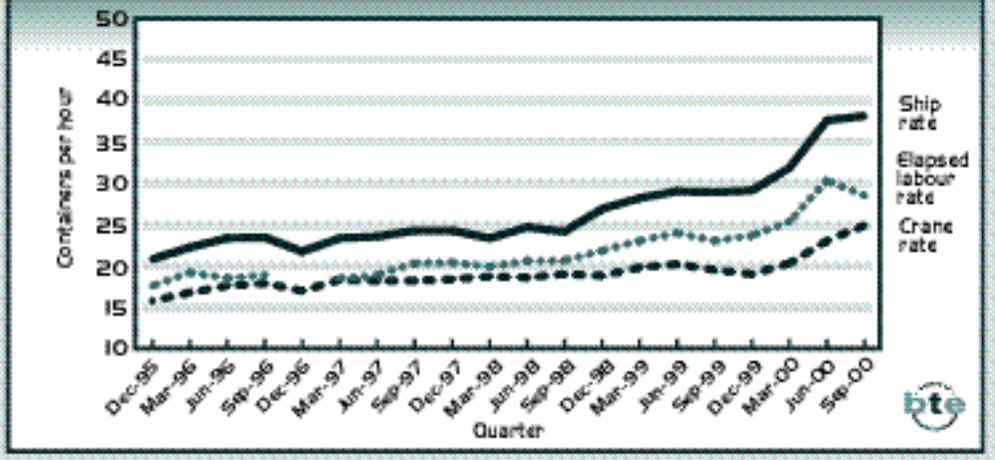


FIGURE 2 BRISBANE

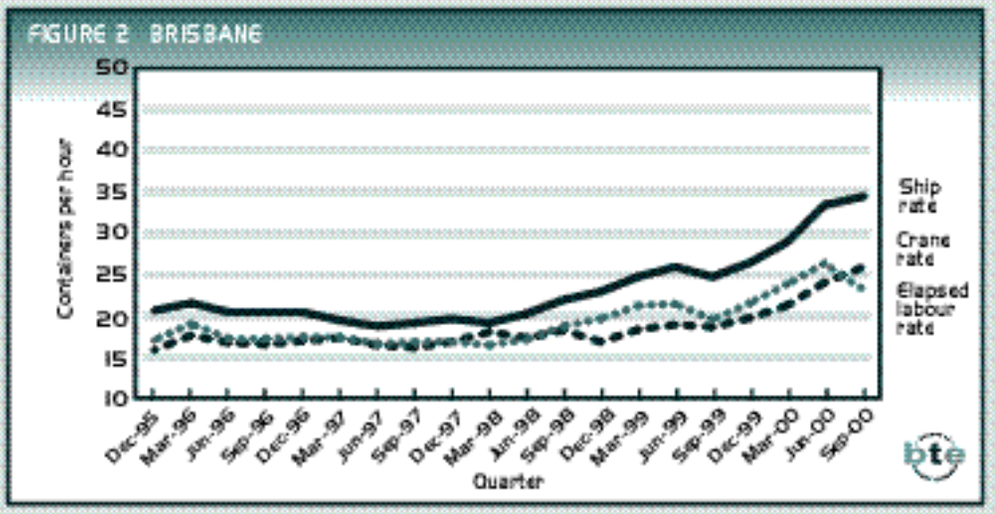
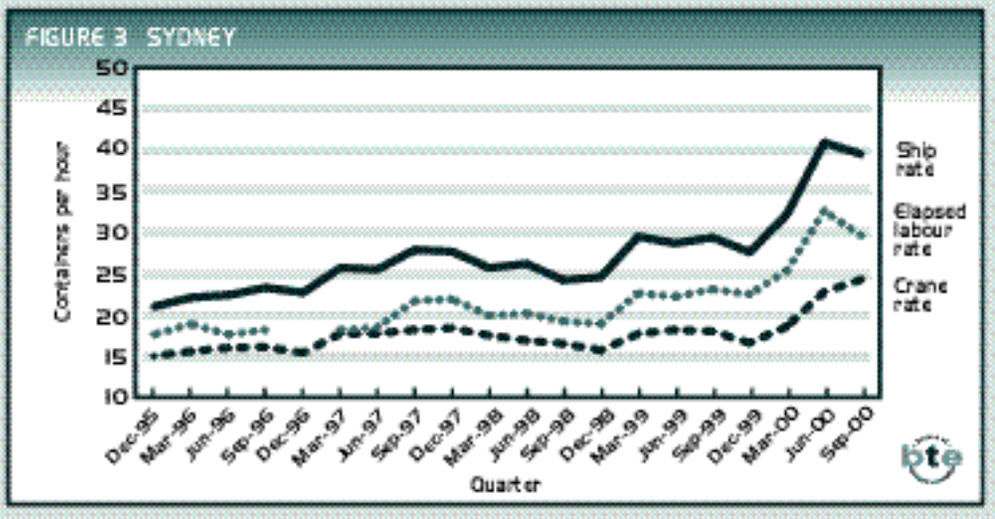


FIGURE 3 SYDNEY



Note These figures are based on data contained in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

CONTAINER TERMINAL PRODUCTIVITY

FIGURE 4 MELBOURNE

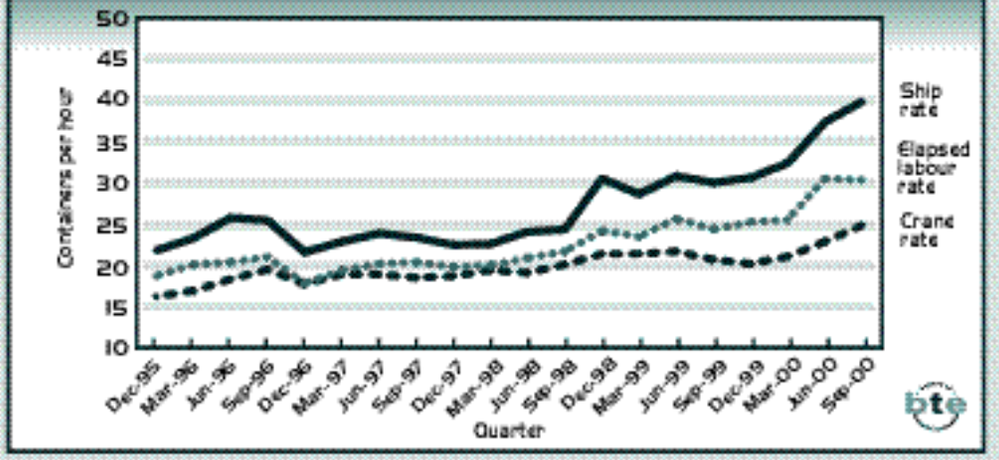


FIGURE 5 ADELAIDE

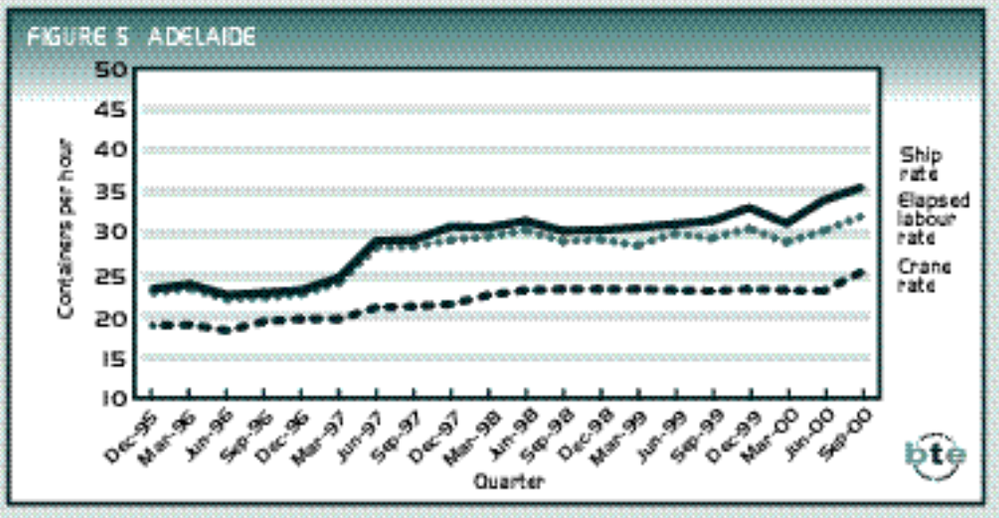
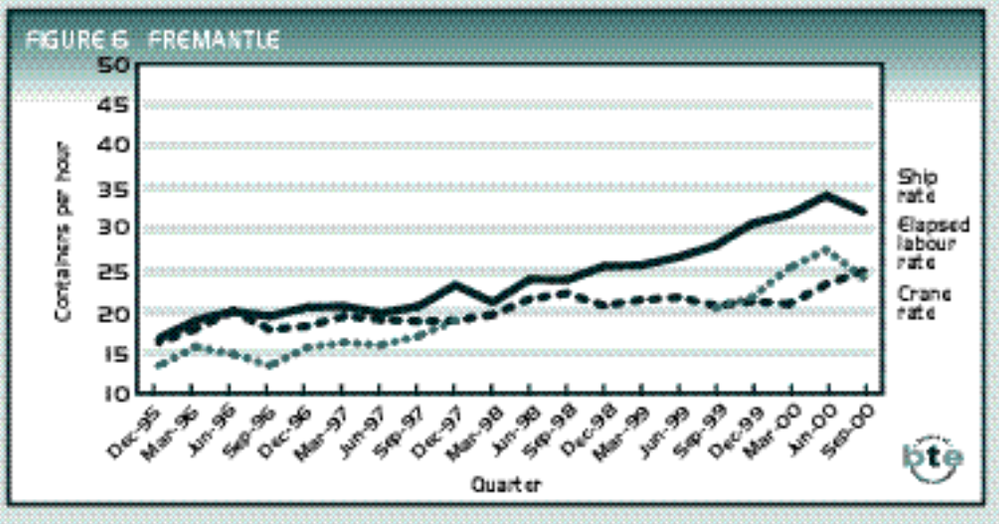


FIGURE 6 FREMANTLE



Note These figures are based on data contained in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and Sea-Land.

WATERFRONT RELIABILITY

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. They cover the timeliness of selected port services,sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

Berth availability, pilotage, towage

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the September quarter 2000. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, SEPTEMBER QUARTER 2000

(Number of ship calls)

	Delay (hrs)								Total no. of ship calls	Berth availability (per cent)
Port/operation	0	1	2	3	4	5–10	11–20	>20		
Brisbane										
Berth availability	46	0	1	0	1	0	0	2	50	96.0
Pilotage	50	0	0	0	0	0	0	0	50	
Towage	49	1	0	0	0	0	0	0	50	
Sydney										
Berth availability	81	0	1	0	1	0	1	1	85	97.6
Pilotage	85	0	0	0	0	0	0	0	85	
Towage	85	0	0	0	0	0	0	0	85	
Melbourne										
Berth availability	92	0	0	0	1	2	2	0	97	95.9
Pilotage	97	0	0	0	0	0	0	0	97	
Towage	97	0	0	0	0	0	0	0	97	
Adelaide										
Berth availability	22	0	0	1	0	3	1	0	27	85.2
Pilotage	27	0	0	0	0	0	0	0	27	
Towage	26	0	0	0	0	1	0	0	27	
Fremantle										
Berth availability	37	0	1	0	0	1	0	0	40	95.0
Pilotage	40	0	0	0	0	0	0	0	40	
Towage	40	0	0	0	0	0	0	0	40	
Five ports										
Berth availability	278	0	3	1	3	6	4	3	299	95.3
Pilotage	299	0	0	0	0	0	0	0	299	
Towage	297	1	0	0	0	1	0	0	299	

Note Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns.

Sources Data for a sample of ship calls provided by shipping lines.

The sample for the September quarter 2000 covers 299 ship calls, equivalent to around 36 per cent of total ship calls at the major container terminals during the period. The proportion of ship calls covered at individual ports ranges from 27 per cent at Brisbane to 44 per cent at Adelaide. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Figure 7 shows that berth availability for the sample of ship calls was 95 per cent in the September quarter 2000. This was slightly higher than in the previous quarter, and is the highest figure recorded since the series commenced in the March quarter of 1997. Caution should be used in undertaking inter-port comparisons of the berth availability data, as there is significant variation between ports in sample sizes and ship call patterns.

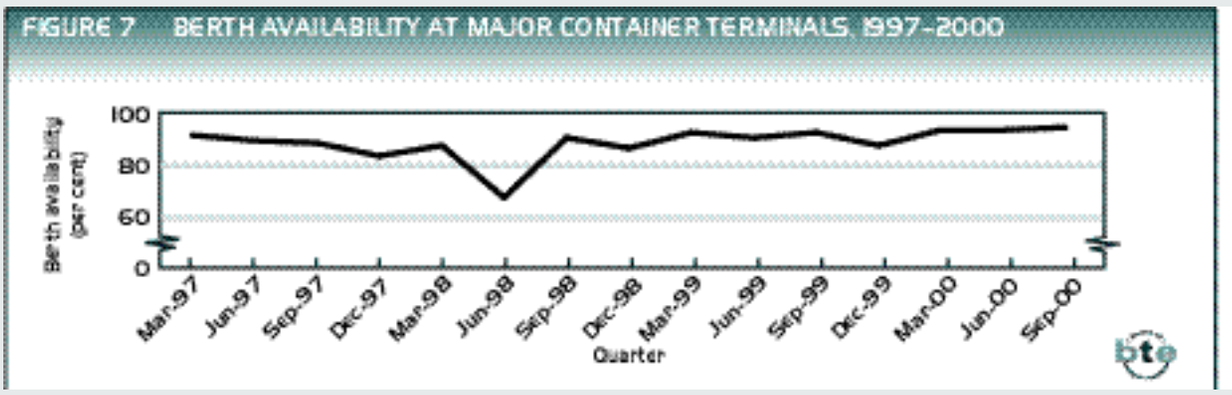
Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 13 hours in the September quarter 2000, the same as in the June quarter 2000.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportion was 100 per cent for the pilotage indicator in the September quarter 2000, the same as in the June quarter 2000. The proportion was 99.3 per cent for the towage indicator in the September quarter 2000,down from 100 per cent in the June quarter 2000. Performance has been at similar levels since the first data (covering the March quarter 1997) were published in *Waterline*.

Other waiting time

The five shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

FIGURE 7 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997–2000



Sources Data for a sample of ship calls provided by shipping lines.

Table 3 summarises the data on other waiting time incidents, which had a duration of at least one hour, in the September quarter 2000. The shipping lines identified a total of 201 incidents (affecting 127 ship calls) for the sample of ship calls over this period. These incidents involved both ship-related and waterfront factors.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The largest single source of other ship waiting time in the September quarter 2000 was the category 'awaiting labour', which accounted for 35 per cent of total waiting time.

TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, SEPTEMBER QUARTER 2000

(Number of incidents)

Incident type	Ship waiting time (hrs) 1	2	3	4	5–10	11–20	>20	Total no. of incidents
Awaiting labour	18	9	10	7	14	6	2	66
Early ship arrival	2	4	3	4	5	1	0	19
Stevedoring finished early	16	7	3	1	3	0	0	30
Crane breakdown	5	4	2	2	0	0	0	13
Pilot/tug booking not at preferred time	13	7	5	0	1	0	0	26
Stevedoring finished late	1	0	0	0	1	0	0	2
Late ship arrival	1	0	1	0	0	3	1	6
Industrial action	0	0	0	0	0	0	0	0
Ship repairs or maintenance	1	2	0	0	4	0	0	7
Weather or tides	2	2	0	0	1	1	1	7
Other	1	7	4	3	6	4	0	25
Total incidents	**60**	**42**	**28**	**17**	**35**	**15**	**4**	**201[a]**

a. These incidents affected 127 of the 299 ship calls covered in table 2.

Sources Data for a sample of ship calls provided by shipping lines.

In the September quarter 2000, 42 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour. The corresponding proportion in the June quarter 2000 was 47 per cent. The average duration of other waiting time was 7.1 hours per affected ship call in the September quarter 2000, up slightly from 6.6 hours per affected ship call in the previous quarter. This increase was due to one very late ship arrival following a boiler breakdown. The average duration of other waiting time, excluding this particular observation, was 6.3 hours per affected ship call.

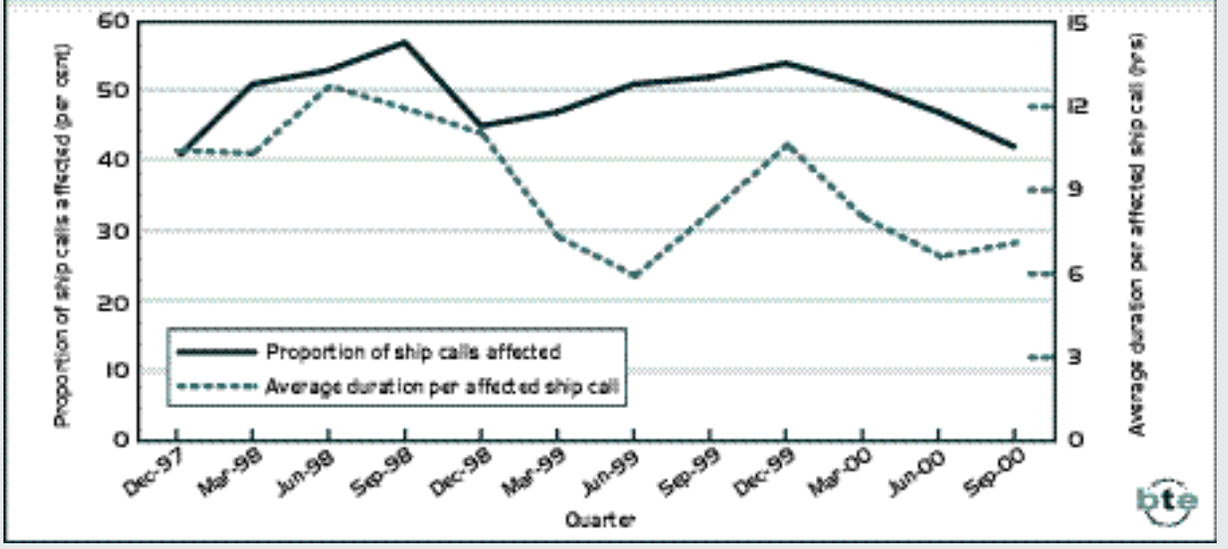
Figure 8 provides information on other ship waiting time over the period since the December quarter 1997. It indicates the proportion of ship calls affected, and the average duration of other waiting time per affected ship call, in each quarter.

Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals — stevedoring rate and cargo receival. Data were not available for Adelaide.

Stevedoring rate provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The main changes over the period covered by table 4 were increases in the stevedoring rates for Brisbane and Sydney.

FIGURE 8 OTHER SHIP WAITING TIME INCIDENTS AT MAJOR CONTAINER TERMINALS, 1997–2000



Sources Data for a sample of ship calls provided by shipping lines.

Cargo receival is the proportion of receivals (exports) completed by the stevedore's cut-off time. It provides a partial measure of one factor that can affect container terminal performance. Cargo receival in the September quarter 2000 was lower than in the June quarter 2000 for Brisbane, Sydney, Melbourne and Fremantle.

Ship arrival

Table 4 includes data for two indicators of ship arrival advice. Data were not available for Brisbane and Melbourne for the September quarter 2000.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation *at 24 hours prior to actual arrival*. Compared with the previous quarter, this indicator fell for Sydney and Fremantle, and was unchanged for Adelaide, in the September quarter 2000.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time *advised inside the 24 hours prior to actual arrival*. This indicator fell for Adelaide and Fremantle in the September quarter 2000, and increased marginally for Sydney.

TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, JUNE AND SEPTEMBER QUARTERS 2000

(per cent)

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Apr–Jun	Jul–Sep	Apr–Jun	Jul–Sep	Apr–Jun	Jul–Sep	Apr–Jun	Jul–Sep	Apr–Jun	Jul–Sep
Stevedoring										
Stevedoring rate	44	51	47	54	52	53	na	na	39	38
Cargo receival	93	84	85	84	94	92	na	na	99	94
Ship arrival										
Advice at 24 hrs	na	na	61	54	na	na	58	58	54	48
Advice inside 24 hrs	na	na	96	97	na	na	95	91	90	83

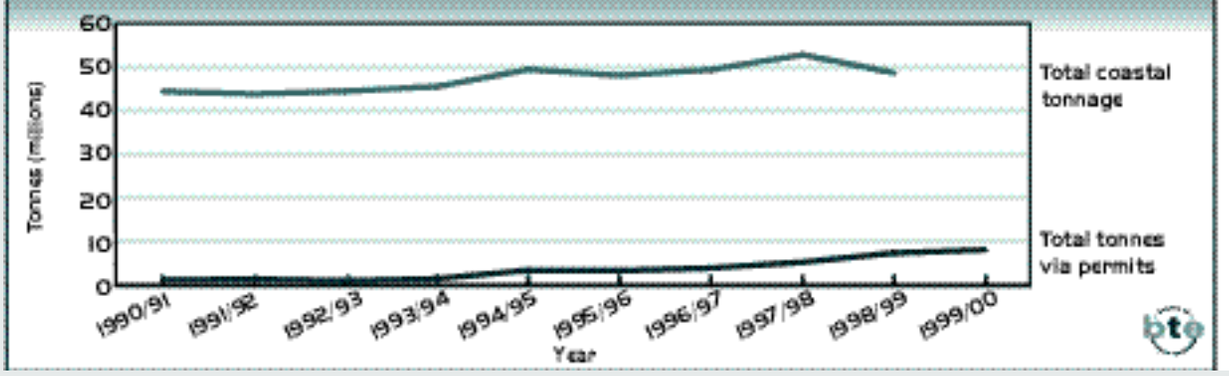
na not available

Sources AAPMA, Patrick and P&O Ports.

COASTAL SHIPPING PERMITS

During 1999/2000, the overall tonnage of cargo moved under a combination of single voyage permits (SVPs) and continuing voyage permits (CVPs) increased by 15 per cent compared with 1998/99 (see figure 9). Figure 9 also shows total tonnage of coastal trade carried via a combination of permits and licenced ships.

FIGURE 9 TOTAL TONNES CARRIED IN THE AUSTRALIAN COASTAL TRADE, 1990/91–1999/00



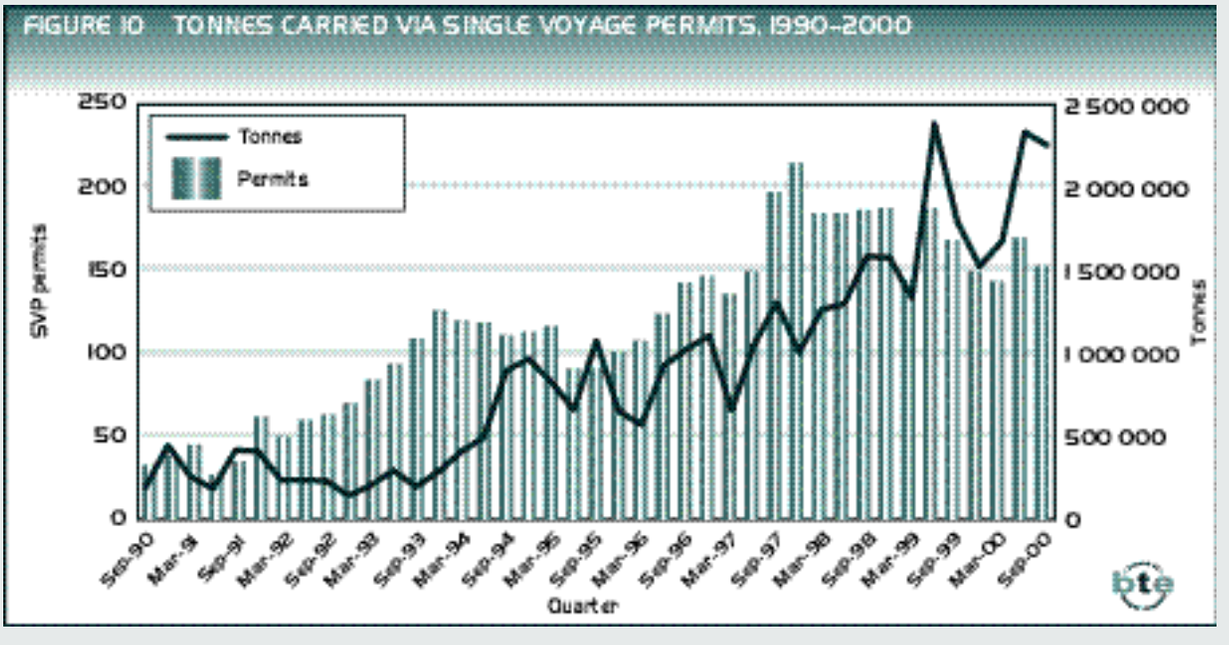
Source Bureau of Transport Economics, Cross-Modal and Maritime Transport Division, Department of Transport and Regional Services.

Single voyage permits

Figure 10 indicates the number of SVPs issued, and tonnes of cargo carried, over the period from the September quarter 1990 to the September quarter 2000. The number of SVPs issued in the September quarter 2000 declined by 10 per cent compared with the June quarter 2000, while the associated tonnes of cargo carried declined by 3 per cent.

The total number of SVPs issued in the 1999/2000 financial year was 629, compared with 704 in 1998/99, representing a decrease of 11 per cent. Over the same period, the number of tonnes of cargo carried using SVPs fell by 7 per cent.

FIGURE 10 TONNES CARRIED VIA SINGLE VOYAGE PERMITS, 1990–2000



Source Cross-Modal and Maritime Transport Division, Department of Transport and Regional Services.

TABLE 5 SUMMARY OF SINGLE VOYAGE PERMITS ISSUED, 1 APRIL 2000 TO 30 SEPTEMBER 2000

Cargo category	Permits issued	Tonnes carried
Bulk cargo		
Petroleum products	62	1 430380
Crude oil & feedstocks	13	632338
Liquefied gas	23	64750
Other bulk liquids	14	89 000
Dry bulk	72	2 084550
General cargo		
Containerised	108	257855
Break bulk	29	26442
Total	**321**	**4 585315**

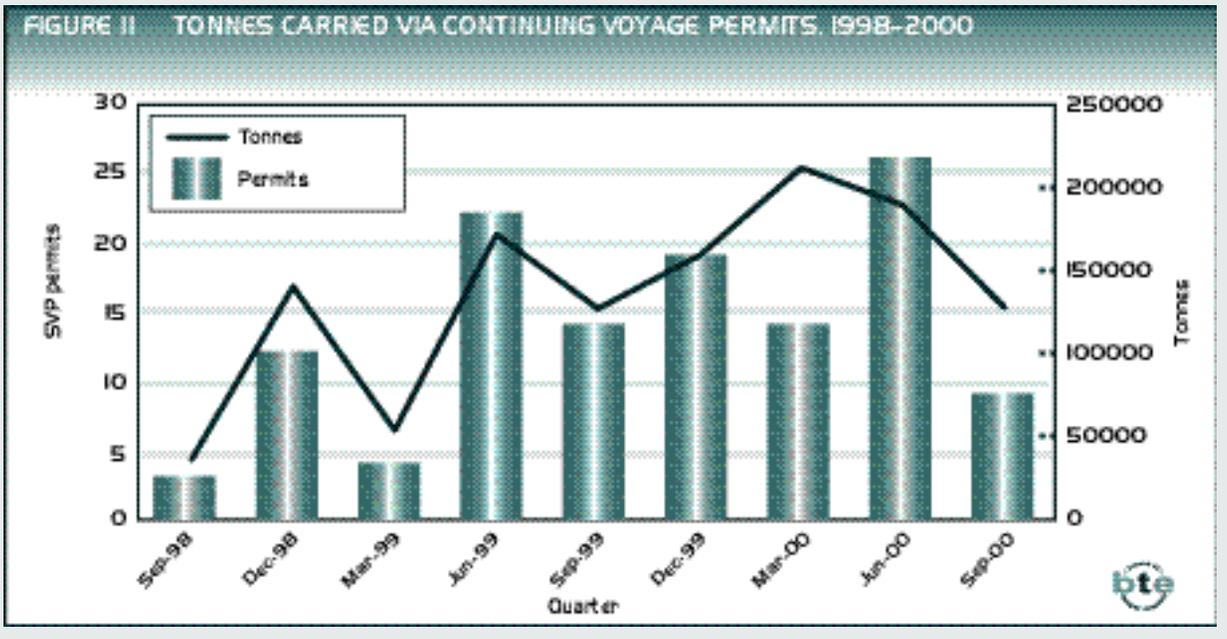
Source *Cross-Modal and Maritime Transport Division, Department of Transport and Regional Services.*

Table 5 shows a breakdown of SVPs by cargo types for the half year between 1 April and 30 September 2000. Containerised cargo permits continue to be the major component of the total number of permits issued. However, bulk cargo accounts for over 90 per cent of the total tonnage moved under permit.

Continuing voyage permits

Although CVPs were available, they were rarely requested or issued prior to 1998. However, as indicated in figure 11, since 1998 there have been significant quarterly fluctuations in both the number of permits issued and the tonnage carried. During the 1999/2000 financial year, 73 CVPs were issued, with approximately 688 000 tonnes of coastal trade either moved, or committed to be moved, using CVPs. Each CVP covers a six-month period which usually translates into six voyages that may otherwise have been undertaken under SVP.

FIGURE 11 TONNES CARRIED VIA CONTINUING VOYAGE PERMITS, 1998–2000



Source Cross-Modal and Maritime Transport Division, Department of Transport and Regional Services.

General information

Part VI of the *Navigation Act 1912* provides for licensed vessels to carry passengers and cargo in the coasting trade. The Act does not restrict the class of vessels that may obtain a coasting trade licence. Any ship, regardless of registry, is able to obtain a licence provided the crew is paid Australian wage rates while it is engaged in the coasting trade, and the ship is not in receipt of foreign government subsidies and has not received such a subsidy in the previous twelve months.

Ships that obtain a licence must also conform to the requirements of the Navigation Act, including specified safety, manning, and crew qualifications, and rehabilitation and compensation provisions. Where suitable licensed vessels are not available, the Act also provides for the issue of single or continuing voyage permits to unlicensed vessels — where this is considered to be in the public interest. The application fee for a passenger SVP is $22 and for a cargo SVP is $200. The application fee for a CVP is $400.

More information on coastal permits can be found on the Department of Transport and Regional Services' internet site at http://www.dotrs.gov.au/.

PORT INTERFACE CHARGES

The port interface cost index ship-based charges published in alternate issues of *Waterline* are presented as a charge per teu. Therefore, this charge per teu tends to increase when the average teu exchange at a port falls, and conversely the charge per teu tends to decrease when the teu exchange rises, even though the charge for a particular service may remain constant.

Figures 12–16 give a breakdown of port interface charges over the past five years *for container ships in the 15,000–20,000 GRT range*. The ship-based charges of conservancy, pilotage, towage, mooring/unmooring and berth hire cover the actual cost to the ship per visit, while the other charges are shown, as charged, on a teu basis.

Stevedoring charge

Stevedoring charges have not been included in figures 12–16 as the BTE has access to these charges in aggregate form only. Stevedoring charges are monitored by the ACCC at Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie, and the aggregate result is published towards the end of each year. The charge in 1995 was $203 per teu, while the latest publicly available charge was $181 for the January–June 1999 period. Therefore, between 1995 and 1999, there was an 11 per cent reduction in the aggregate stevedoring charge.

Brisbane

Figure 12 shows that Brisbane recorded a fall of 28 per cent in state conservancy charges, 27 per cent in towage charges (caused by a reduction in the number of tugs required), 2 per cent in customs brokers' import fees, and 8 per cent in customs brokers' export fees. Mooring/unmooring charges increased by 19 per cent, and road transport charges by 9 per cent. Pilotage charges, wharfage and harbour dues remained unchanged.

Sydney

Figure 13 shows that Sydney recorded a fall of 15 per cent in tonnage charges, 39 per cent in pilotage charges, 25 per cent in towage charges (caused by a reduction in the number of tugs required), one per cent in road transport charges, 3 per cent in customs brokers' import fees, and the elimination of wharfage on empty containers. Customs brokers' export fees increased by 10 per cent, while mooring/unmooring charges and wharfage on loaded containers remained unchanged.

Melbourne

Figure 14 shows that Melbourne recorded a fall of 56 per cent in tonnage charges, 6 per cent in towage charges (mainly caused by a reduction in the number of tugs required for the inward trip from July–December 1998 onwards), 67 per cent in mooring/unmooring charges, 45 per cent in wharfage on loaded containers, 7 per cent in customs brokers' import fees, 2 per cent in customs brokers' export fees, and the elimination of wharfage on empty containers. Melbourne's berth hire charge is calculated on the time a ship is at berth. Since berth times differ for each ship visit, an average berth time over the past five years was calculated and this figure was used to calculate the berth hire charges. In actual changes, the rate-per-hour berth hire charge dropped 19 per cent in July 1997. Melbourne's road transport charges increased by 6 per cent, and pilotage charges remained unchanged.

FIGURE 12 PORT INTERFACE CHARGES AT BRISBANE, 1995–2000

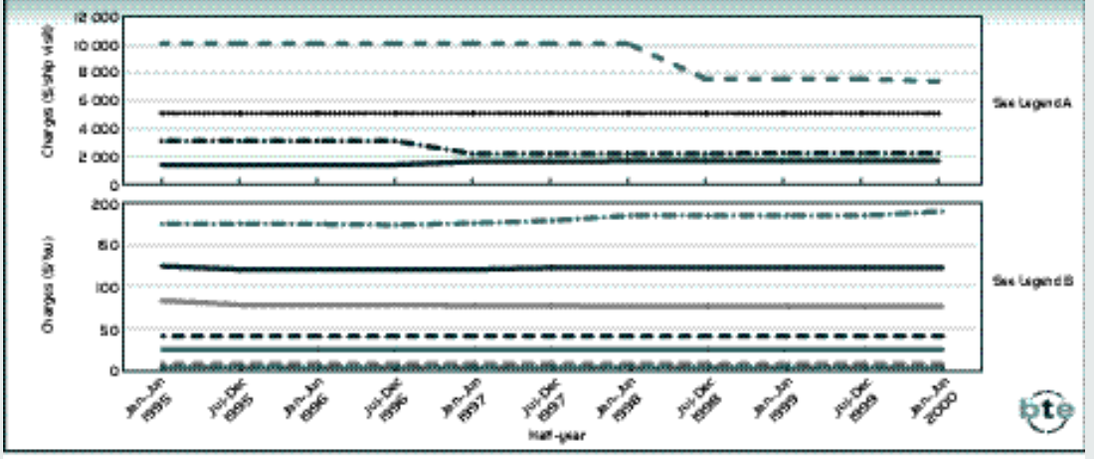


FIGURE 13 PORT INTERFACE CHARGES AT SYDNEY, 1995–2000

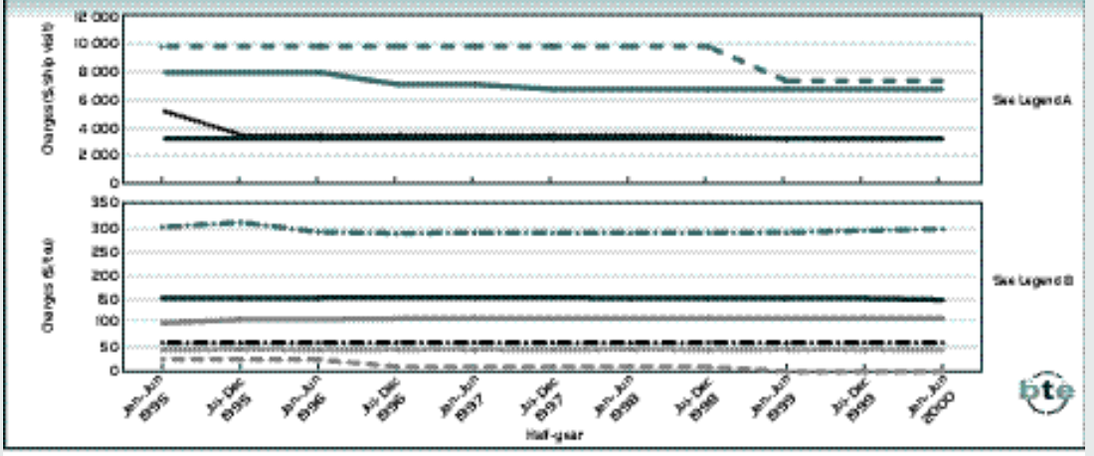
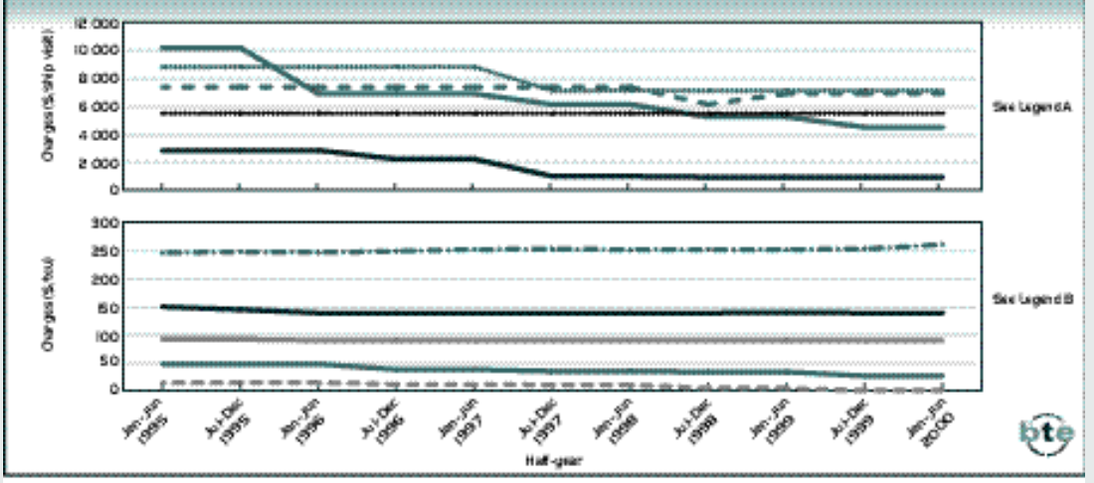


FIGURE 14 PORT INTERFACE CHARGES AT MELBOURNE, 1995–2000



Legend A

- Mooring, unmooring
- Towage
- Pilotage
- Conservancy
- Tonnage
- Berth hire

Legend B

- Customs brokers, export
- Customs brokers, import
- Harbour dues, empty
- Harbour dues, loaded
- Wharfage, empty
- Road transport
- Wharfage, import or export
- Wharfage, export
- Wharfage, import

Sources BTE estimates based on: price schedules of relevant port authorities/corporations and State departments of transport; pilotage, towage and mooring/unmooring service providers; and surveys of customs brokers and road transport operators.

FIGURE 15 PORT INTERFACE CHARGES AT ADELAIDE, 1995–2000

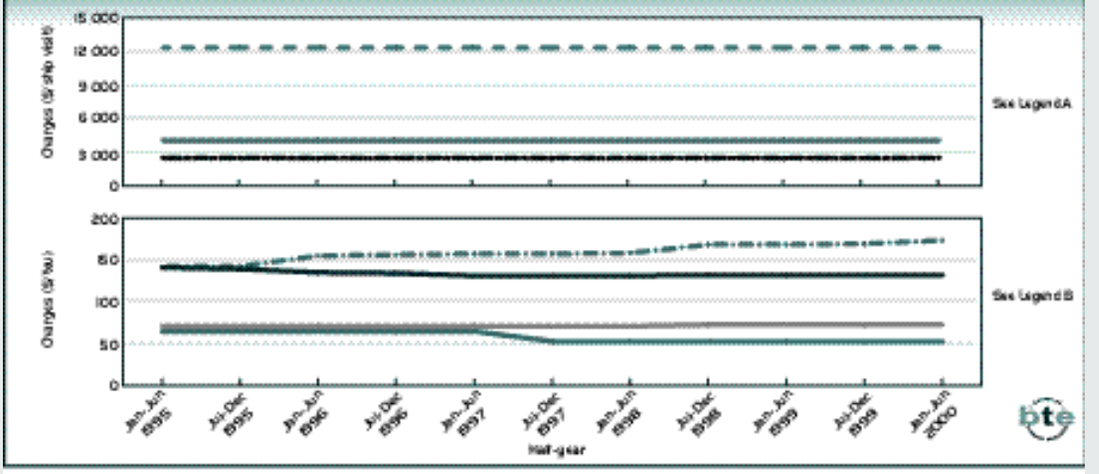
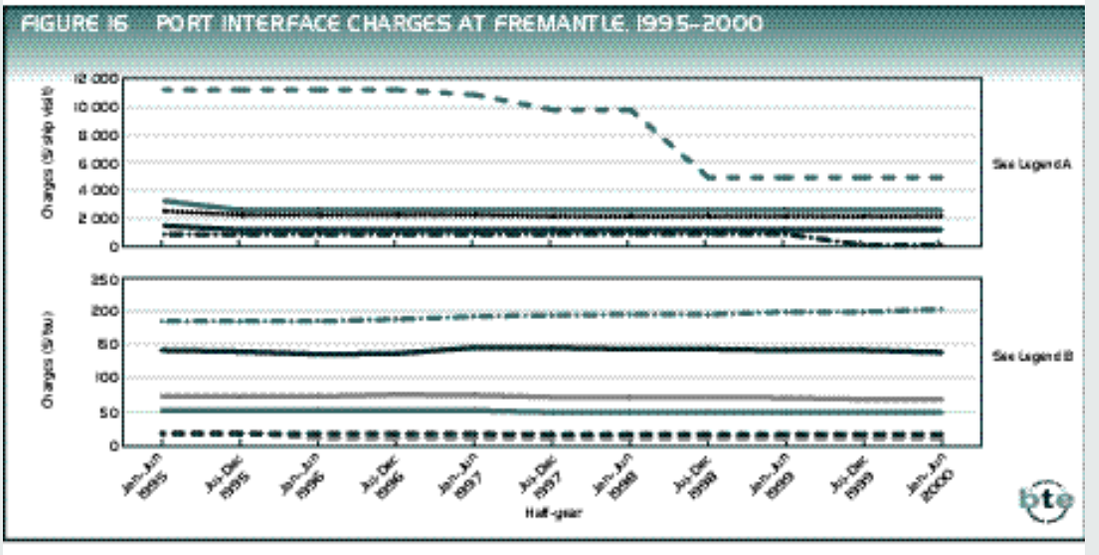


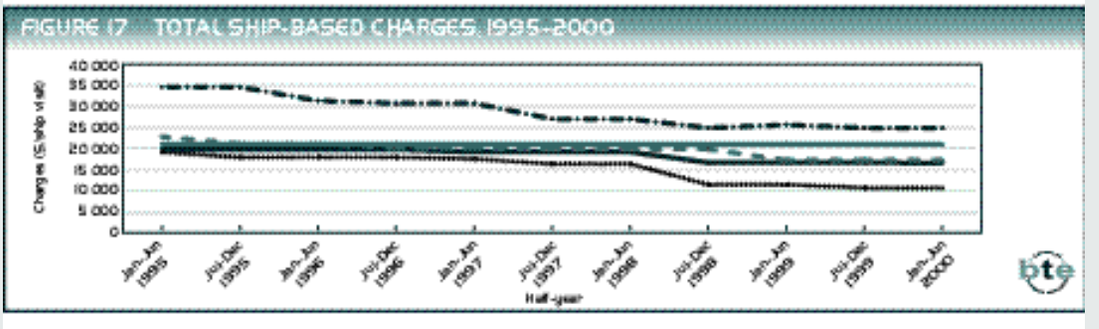
FIGURE 16 PORT INTERFACE CHARGES AT FREMANTLE, 1995–2000



Legend A

Legend B

FIGURE 17 TOTAL SHIP-BASED CHARGES, 1995–2000



Sources BTE estimates based on: price schedules of relevant port authorities/corporations and State departments of transport; pilotage, towage and mooring/unmooring service providers; and surveys of customs brokers and road transport operators.

Adelaide

Figure 15 shows that Adelaide recorded a fall of 18 per cent in wharfage on loaded containers, and 6 per cent in customs brokers' import fees. Road transport charges increased by 22 per cent, and customs brokers' export fees by 3 per cent. All Adelaide ship-based charges remained unchanged throughout the period. The conservancy charge (navigation service charge) for Adelaide reduces for each additional ship visit within a six-month period, and the tonnage charge (harbor service charge) is based on the berth time. Five-year averages for the fluctuating variables of these two charges were calculated and used to obtain the overall charge per period that is shown in figure 15.

Fremantle

Figure 16 shows that Fremantle eliminated state conservancy charges, and recorded a fall of 21 per cent in tonnage charges, 16 per cent in pilotage charges, 56 per cent in towage charges (caused by a reduction in the number of tugs required), 22 per cent in mooring/unmooring charges, 5 per cent in wharfage on loaded containers, 52 per cent in wharfage on empty containers, 5 per cent in berth charges on loaded containers, 2 per cent in customs brokers' import fees, and 6 per cent in customs brokers' export fees. Road transport charges increased by 10 per cent.

Total ship-based charges

Figure 17 shows the total ship-based charges for each of the five container ports. Over the past five years, Brisbane ship-based charges have fallen by 17 per cent, Sydney by 25 per cent, Melbourne by 28 per cent, and Fremantle by 44 per cent. Adelaide ship-based charges remained unchanged.

ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
BTE	Bureau of Transport Economics
CVP	Continuing Voyage Permit
SVP	Single Voyage Permit
teu	Twenty-foot equivalent unit

TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS— PRODUCTIVITY IN TEUS PER HOUR

	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00
Five ports																	
Ships handled	871	907	865	891	907	963	909	845	1020	942	942	958	979	933	875	808	840
Total teus	497 140	519 206	441 697	483 372	549 247	585 474	527 881	514 409	633 107	612 019	573 444	602 501	660 593	726 590	678 046	666 967	708 433
Crane rate	22.3	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5	25.9	25.4	24.8	26.6	30.4	33.2
Elapsed rate	23.6	na	23.1	23.8	26.0	25.8	na	na	na	na	na	na	30.1	30.8	33.3	40.0	38.0
Net rate	29.1	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2	37.3	37.7	37.8	41.7	49.5	50.8
Brisbane																	
Ships handled	140	141	156	164	162	177	170	168	192	180	176	193	224	232	219	178	187
Total teus	66 115	62 904	47 471	65 572	73 184	71 043	58 857	74 023	87 373	84 200	75 444	88 311	98 944	106 096	97 431	90 932	103 654
Crane rate	20.6	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6	23.4	23.3	24.6	26.4	30.5	33.4
Elapsed rate	20.9	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3	26.7	24.7	27.0	29.8	33.4	30.0
Net rate	25.1	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6	32.2	31.2	33.1	36.1	42.3	45.1
Sydney																	
Ships handled	228	249	251	249	243	266	238	219	267	230	221	243	259	244	221	218	223
Total teus	156 344	174 982	158 323	167 705	183 978	201 535	176 496	168 234	209 619	203 042	187 287	203 536	226 784	260 927	229 014	224 445	237 843
Crane rate	20.3	19.6	22.3	20.5	23.5	23.5	22.5	21.8	21.6	20.4	23.2	24.0	23.7	22.1	24.8	30.9	33.1
Elapsed rate	23.1	na	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6	29.3	30.6	30.1	34.0	44.1	40.5
Net rate	29.5	28.9	22.7	23.3	36.1	35.5	33.1	33.9	32.0	32.3	38.8	38.0	38.9	36.8	43.0	55.4	53.9
Melbourne																	
Ships handled	274	282	230	249	268	281	276	234	309	274	271	282	278	266	247	217	227
Total teus	203 371	202 376	162 156	177 070	208 200	223 465	207 346	185 803	242 456	219 549	206 727	215 379	241 775	257 147	243 277	236 306	253 568
Crane rate	24.5	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5	28.1	27.4	26.5	27.9	30.3	33.5
Elapsed rate	26.5	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2	33.1	32.4	33.4	33.8	40.5	40.9
Net rate	32.2	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9	39.7	39.9	40.4	43.0	49.4	53.8
Adelaide																	
Ships handled	70	74	69	65	68	66	60	66	63	74	73	66	62	62	56	56	62
Total teus	20 519	23 351	21 963	20 933	25 982	25 188	22 260	27 975	25 493	32 556	31 326	29 569	28 271	30 597	27 736	30 551	30 945
Crane rate	22.7	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0	27.9	27.2	27.2	29.4	27.8	29.1
Elapsed rate	26.2	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8	36.3	34.7	35.9	36.8	36.7	37.0
Net rate	26.8	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7	37.6	37.2	38.8	39.7	41.1	41.0
Fremantle																	
Ships handled	159	161	159	164	166	173	165	158	189	184	201	174	156	129	132	139	141
Total teus	50 791	55 593	51 784	52 092	57 903	64 243	62 922	58 374	68 166	72 672	72 660	65 706	64 819	71 823	80 588	84 733	82 423
Crane rate	20.8	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6	27.3	26.1	27.2	27.4	30.5	33.5
Elapsed rate	16.0	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na	na	25.8	27.9	33.0	36.0	32.4
Net rate	22.6	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0	33.4	35.3	38.8	41.6	44.7	43.2

na not available

Notes 1. Data for the Sea-Land terminal at Brisbane are incorporated from the December quarter 1999 onwards.

2. Elapsed rates and net rates from March quarter 1997 onwards are not directly comparable with earlier figures (except at Adelaide) due to changes in a terminal operator's information systems.

3. For data back to the December quarter 1989, refer to Waterline 15.

Sources Patrick, P&O Ports and Sea-Land.

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