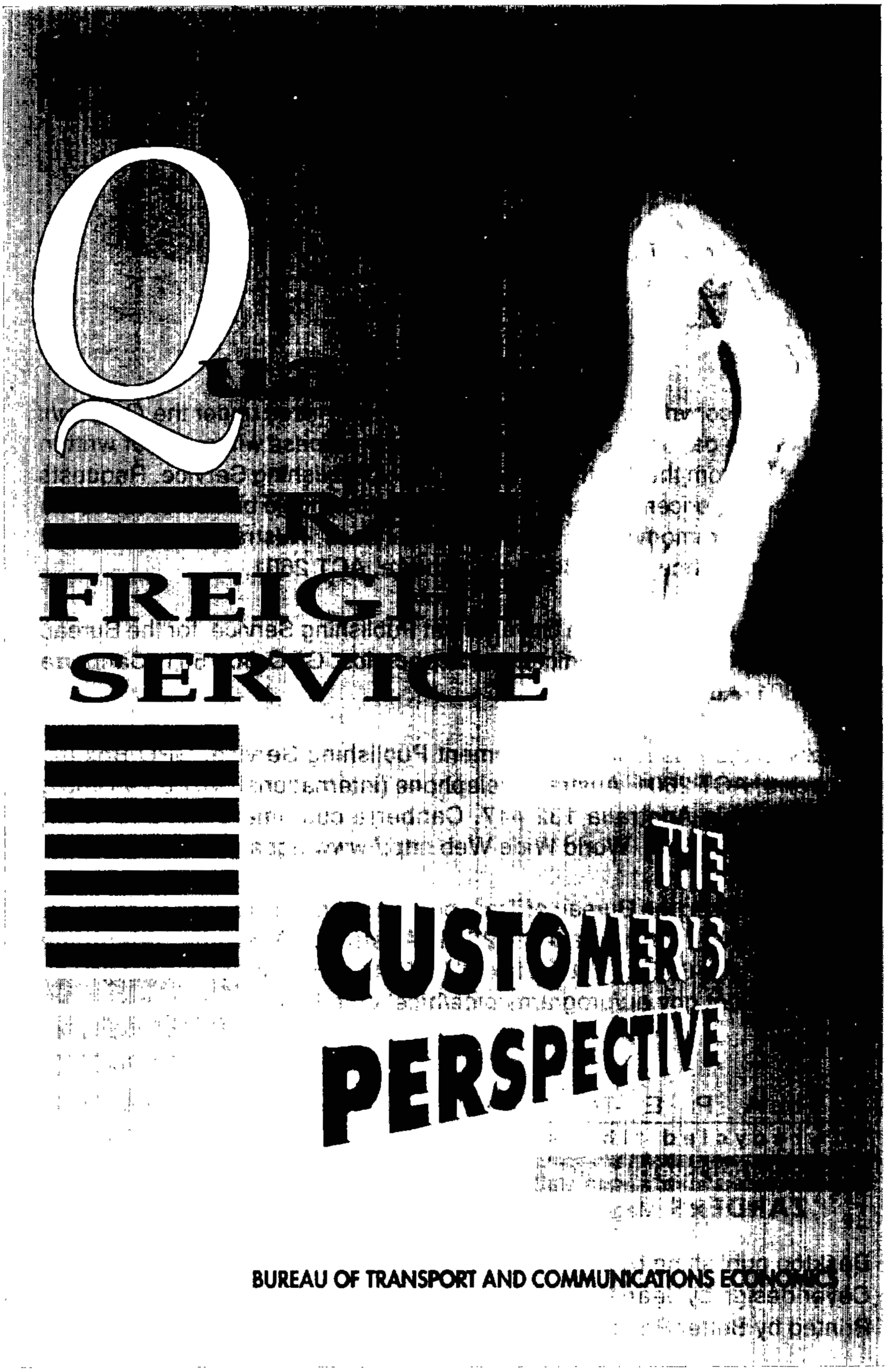
Quality of Rail Freight Service: The Customer's Perspective

Report

Indicators currently published by Australian railways do not measure service standards from the viewpoint of customers, but rather are based on statistics compiled by management for other purposes.



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FOREWORD

Over the last decade, owner governments have focussed increasingly on the financial performance of their business enterprises.

Despite the dominant position held by most government business enterprises in their respective markets, however, there has been little, if any, monitoring of the quality of the services provided. Monitoring of financial performance and prices alone is insufficient because price increases can be avoided (or profits maintained) by reducing the quality of the services provided.

Quality of service can be assessed by governments in a number of ways. It is most commonly measured in terms of operational efficiency. However, this report presents BTCE findings on the quality of service from the customer's viewpoint, rather than from the perspective of the owner or the corporation itself.

Information for the study was supplied by all of the government owned railways plus a number of freight forwarders and other organisations. Their assistance and advice is gratefully acknowledged. The BTCE would especially like to thank the many truck drivers in Melbourne and Perth who assisted the study by recording their arrival and departure times at Dynon and Kewdale rail terminals.

The principal author of the report was Pat McNamara, assisted by Tony Carmody, Martin Kunz, and Bogey Musidlak. Marco Heijboer of DoTRD Information Systems provided assistance with data processing. As a Visiting Fellow at the BTCE, Elizabeth Barber of the Australian Defence Force Academy contributed to the early stages of research as part of the research team. She also provided useful comments on the final draft of the Report.

David Luck (Research Manager) supervised the bulk of the research, and Leo Dobes was responsible for its finalisation.

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ABSTRACT

Punctuality—delivering cargoes on time—is the most important aspect of service quality for customers shipping containers by rail, according to freight forwarders surveyed in 1995 by the Bureau of Transport and Communications Economics (BTCE).

Indicators currently published by Australian railways do not measure service standards from the viewpoint of customers, but rather are based on statistics compiled by management for other purposes.

BTCE monitoring of National Rail Corporation container train services operating between the terminals of Dynon (Melbourne) and Kewdale (Perth) over two weeks in May and June 1996 revealed that:

- most trucks moved through the terminals quickly but a minor percentage faced relatively long delays;
- average truck transit times at terminals varied from hour to hour during the day, and from day to day during the week;
- average gate-to-gate times varied with the number of containers carried on each trip;
- trucks going to and coming from Dynon terminal are frequently delayed by closure of the rail level crossing across Docklink Road.

KEY POINTS

Published performance indicators for Government Business Enterprises tend to focus on either the financial interests of the government as owner, or on the operational efficiencies that are of immediate interest to corporate managers.

However, the quality of service provided to customers is also important. Dividends could be increased, or prices kept low, simply by reducing the quality of services provided to customers.

Currently published indicators do not measure service quality from the customers' viewpoint because thay were originally designed to measure operational efficiency for managers. However, punctuality indicators do not show the percentage of freight made available to customers on time, wagon availability figures do not show whether available cargo space is adequate, and cargo damage figures are an underestimate.

A survey of rail freight forwarders by the BTCE in 1995 identified five aspects of service that are important to users of rail services. In order of priority, these are:

- Punctuality in the availability of cargo. Punctuality of the trains themselves (an important operational consideration) is of limited relevance to freight forwarders who must schedule trucks, staff and warehouse deliveries on the basis of the time when cargo becomes available.
- Care of cargo and containers, particularly during handling in terminals.
- Turn-around times in terminals because of the expense of idle trucks and drivers.
- Ready availability of wagon capacity for outbound cargo.
- The quality of railway staff.

A further BTCE survey for 2 weeks in 1996 of National Rail Corporation trains operating between Melbourne and Perth found that trains generally arrived on time, and that most trucks were able to clear terminals relatively quickly.

EXECUTIVE SUMMARY

Good rail service quality is being able to consign cargo on time, have it all delivered to the right place, at the right time, without damage, and then receive an accurate bill.

All six Australian government railway authorities have been involved to differing degrees in the process of microeconomic reform over the past decade. Three major sets of stakeholders have an interest in the progress and results of the reforms.

As sole owners, governments have naturally had a major interest in the financial performance of their railway corporations. Monitoring mechanisms were therefore established at an early date by each government, with the Industry Commission collecting and publishing comparative statistics on items such as profits, dividends and rates of return on capital. Because of the general lack of competition in the provision of rail freight services (the National Rail Corporation being a partial exception), governments have also monitored prices, and the Bureau of Industry Economics was commissioned to produce a series of benchmarking studies to provide comparisons with overseas railways.

The managers of railway corporations also have a need to monitor performance, mainly from an operational perspective, as they seek to improve corporate efficiency. While approaches differ between the various corporations, the six major aspects of quality in freight services that are currently reported publicly are train punctuality, care of cargo, availability of rolling stock, customer satisfaction, delivery of cargo, and turn-around times for customers' trucks with terminals. Only the first two indicators are published for all six rail authorities.

Reflecting the operational focus of the corporations, however, the published indicators provide information that is better suited to assessing organisational efficiency, rather than satisfaction of customers' needs. Arrival times of trains are recorded, for example, rather than the punctuality of availability of cargo to customers. Wagon availability indicators do not reveal whether capacity is adequate for local customers' needs because they only give the percentage of wagons in working order for the rail system as a whole. And cargo care statistics tend to record only damage for which compensation payments have actually been made by rail authorities, rather than for all damage incurred.

However, customers are the third major, if not ultimate set of potential beneficiaries of microeconomic reform in the rail sector. Indeed, governments cannot be confident that apparent improvements in the commercial efficiency of their rail enterprises are genuine without also monitoring the quality of the services provided to customers. Dividends could be increased, or prices kept low, simply by reducing the quality of the services provided. But little direct work appears to have been published on the assessment or monitoring of the interests of the users of rail services.

The BTCE has therefore sought in this Report to identify the needs and priorities of the users of rail services. The study was limited to non-bulk freight, both because of availability of information, and because shippers of bulk freight often have sufficient countervailing market power themselves to negotiate service standards with rail authorities. Non-bulk freight was defined as cargo in containers, vans or open wagons, including steel, paper, cars and commodities in containers or dry bulk containers. Bulk freight comprises commodities poured loose into wagons, such as wheat.

In order to establish a list of indicators of service quality of direct relevance to the users of rail freight services, the BTCE surveyed major rail freight forwarders in 1995. A large proportion of rail freight is consigned by forwarders rather than the actual owners of the commodities being shipped. Forwarders are therefore the primary decision-makers in choosing between road and rail. They are obviously influenced by relative standards of service, as well as by freight rates.

The BTCE survey established that punctuality is critical to forwarders. Everything hinges on arrival times, with late trains causing scheduling problems that may snowball during the day.

Collection of containers from consignors and delivery to warehouses is often by appointment. Warehouse managers aim to keep cargoes arriving at a steady rate during the day, avoiding peaks and keeping staff fully employed. For both forwarders and warehouse managers, this entails detailed scheduling and matching of resources (labour, trucks, containers and fork-lifts) to demand. Unless resources can be re-allocated and subcontractors cancelled, a late train inevitably imposes costs. When a late train eventually arrives, further rescheduling is required, and additional resources may need to be hired.

While punctuality was seen as by far the most important aspect of service quality, forwarders ranked in approximately equal order of importance in second, third and fourth place the following characteristics (the quality of railway staff was fifth):

- care of cargo and containers: forwarders identified cargo handling in terminals as the time during which the most serious damage was caused. (Modern railway practices avoid or minimise shunting and wagons are designed to minimise vibration). In addition to compensation payments to customers and container repair costs, the risk of damage forces forwarders to invest in extra containers to substitute for units out of service.
- rail terminal efficiency: because trucks and drivers (and to some extent containers) are a major cost to forwarders, rail terminal efficiency, in terms of turn-around times, is considered to be an important aspect of service quality.
- lack of wagon capacity: this has an effect similar to train delays, except that forwarders may receive advance warning of the problem. When faced with wagon shortages, forwarders often switch to road transport. In the past, wagon shortages have induced precautionary block bookings by some forwarders, thereby exacerbating the problem for others.

In order to gain some practical insights into levels of service quality, the BTCE monitored for two weeks in mid-1996 the shipment of containers by rail between Melbourne and Perth on National Rail Corporation trains. Because the BTCE relied on freight forwarders' staff for monitoring, the survey was necessarily limited to four readily observable indicators: train punctuality, terminal efficiency, cargo care and short shipping. Overall, some 1500 truck trips and 2400 container movements were monitored. However, the limited period involved means that the results of the survey must be taken as being indicative only.

Punctuality statistics published by railway authorities, classify trains less than 30 minutes late as being on time. Of the 14 eastbound NRC trains monitored by the BTCE, seven arrived at Dynon (Melbourne) on time; of the remainder, five were late by less than 30 minutes, and two by over half an hour. Of the 16 westbound trains only two arrived on time at Kewdale (Perth) and 14 were late, with 12 of these arriving more than half an hour behind schedule. However, this performance was less inconvenient to customers than it appears, because some of the late trains arrived during the night when Kewdale is not open for collection of cargoes. Although the trains were late by rail standards, their cargoes arrived before the time required by consignees.

Most trucks transited the rail terminals quickly, with a minor percentage facing relatively long delays. No containers were seriously damaged during the monitoring period. Problems with short shipping were also minimal. The number of containers left behind totalled about a dozen from eastbound services, and about fifteen from trains leaving Melbourne for Perth.

All trucks proceeding to or from Dynon rail terminal travel along the Docklink Road. The road was designed to speed container movements between Dynon and the shipping terminals but also carries trucks travelling to and from other areas of Melbourne. However, frequent delays are incurred by closure of the rail level crossing across Docklink Road. Although not part of the monitoring exercise, it was reported that the road was closed for a total of 12 hours out of the 70 hours covered by the survey. This problem could worsen in future as more cargo moves through Dynon (thus delaying more trucks) or the number or length of trains increases.

CHAPTER 1 WHY ASSESS QUALITY OF SERVICE?

Like other government trading enterprises (GTEs), State and Commonwealth rail authorities have been subject to microeconomic reform over the last decade or so.

All government rail operators are moving towards more commercial operating practices although they remain fully owned by their respective governments, and most still operate at a deficit. Appendix I gives information on the six Australian government rail systems.

WHY QUALITY?

In monitoring the performance of their railway corporations, governments (as owners) focus naturally on dividends and rates of return on capital. Because of the lack of competition in the provision of rail freight services (the National Rail Corporation is a partial exception) governments also monitor prices charged to customers.

However, governments cannot be confident that apparent improvements in the commercial efficiency of their rail enterprises are genuine without also monitoring the quality of the services provided. Dividends could be increased, or prices kept low, simply by reducing the quality of the services provided to customers. Monitoring of quality (or prices) would not be required if there were effective competition.

Knowledge of current levels of quality of service is also required to assess any proposed investment in infrastructure. Evaluations of proposed rail line upgradings, for example, should take account of the benefits to customers from any improvements to service quality.

As owners of railways, governments also have a commercial interest in improving service quality. Better service standards will improve the financial performance of railways, making them more competitive with road and sea transport, and giving them the chance to increase profits by charging higher prices or increasing market share. Improved profits, in turn, will assist in reducing the deficits currently faced by Australian rail systems, opening the possibility of future returns on equity.

Furthermore, improvements in the quality of service delivery are essential to maximising the benefits of microeconomic reform. Improvements in transport services will assist Australian industries by reducing costs and making them more competitive in domestic and export markets.

CURRENT MONITORING OF SERVICE QUALITY BY GOVERNMENTS

Monitoring of the commercial performance of GTEs began in the early 1990s, following the initial implementation of microeconomic reforms. The two main agents of assessment have been:

- The Steering Committee on National Performance Monitoring of GTEs, a joint Commonwealth–State body set up by the 1991 Special Premiers' Conference and charged with the responsibility of developing and publishing performance indicators (Steering Committee 1995).
- The Bureau of Industry Economics (BIE), whose functions were merged into the Productivity Commission in early 1996. The BIE produced a series of reports assessing the performance of Australian government enterprises by benchmarking them against comparable foreign industries (BIE 1992, 1993, 1995a, b).

Both the Steering Committee and the BIE have published comprehensive data on the financial and economic performance of government railways, but comparatively little information on service standards. This largely reflects the paucity of data available from railways on the quality of their provision of services. Chapter 2 and Appendix II provide details of what is published.

Further, many of the published data do not measure service quality from the customer's viewpoint, but rather are based on statistics compiled by management for other purposes.

For example, it is a moot point whether published indicators of punctuality measure customer satisfaction or the efficiency of mainline train operations. The figures published in annual reports on freight operations generally show the percentage of all trains arriving at their destination within thirty minutes of the scheduled time. They do not show the average length of train delays, the performance of trains on each route, or the variability in delays.

A rail customer consigning cargoes out of Melbourne cannot determine from published sources whether the trains to Sydney and Brisbane arrive on time, whether the average delay is measured in minutes or hours, or whether punctuality performance is consistent. A consistent delay of 30 minutes would be easier to plan for—and hence less costly to transport operators—than a service for which arrival times varied from day to day.

Published punctuality statistics do not show what customers are really interested in; whether cargoes are available for collection when required. Even when a train arrives on time, railways can still be late in making cargoes available for collection by customers because of delays within the terminal.

THE BTCE APPROACH: TAKING THE CUSTOMERS' PERSPECTIVE

In 1991 the Bureau of Transport and Communications Economics (BTCE) began a series of research projects on service quality in the transport and communications sectors. This report is the third in a series, following *Quality of Service: Conceptual Issues and Telecommunications Case Study* (BTCE 1991) and *Quality of Service in Passenger Aviation* (BTCE 1992).

The approach adopted is that of Lancaster (1966) in which a product is viewed as a bundle of characteristics. Consumers derive utility from the characteristics embodied in or associated with the product or service rather than from the product or service itself. For example, relevant service characteristics of a rail freight operation might include its frequency, transit speed, and standard of care for cargoes. BTCE (1991, pp. 7–16) gives a more detailed exposition of the conceptual approach.

The aim of this study was to identify the key aspects of service for customers using non-bulk rail freight services, such as container trains. Non-bulk freight can be defined as cargo in containers, vans or open wagons, including steel, paper, cars and commodities in tank containers or dry bulk containers. Bulk freight is usually defined as commodities poured loose into wagons, such as wheat or petroleum. Appendix I gives information on non-bulk rail freight transport in Australia.

The BTCE limited its study to non-bulk freight because this has been an area of particular interest to governments in recent years, following the establishment of the National Rail Corporation and the Track Australia initiative, which proposes a unified system for control and access of the interstate track network.

Further, some of the State rail systems have been reluctant to disclose information on their bulk freight business until the effects of reforms in competition policy have become clearer. In any case, many bulk shippers have sufficient market power to enable them to negotiate with rail authorities the standards of service they wish to receive.

In carrying out this study, the BTCE first developed a list of seventeen service characteristics that might be important for Australian non-bulk rail freight services. The list was used in a BTCE survey of rail freight forwarders in which respondents were asked to describe and rank service characteristics important to customers.

To gain first-hand information, the BTCE monitored rail service quality to customers on NRC trains running between Melbourne and Perth during the period 27 May to 8 June. The results of the monitoring are given in Chapter 5.

CHAPTER 2 SHORTCOMINGS OF INDICATORS CURRENTLY USED BY AUSTRALIAN RAIL SYSTEMS

Most government railways in Australia publish only one or two performance indicators in their annual reports, which show the standard of service provided to their freight customers. Taken together, the indicators published by railways cover six aspects of service quality.

Rail performance indicators have also been published by two organisations monitoring the performance of GTEs: the Bureau of Industry Economics (BIE 1995a, b) and the Steering Committee for National Performance Monitoring of GTEs (Steering Committee 1995). Appendix II gives details of the indicators published by each rail system.

PUBLISHED INDICATORS

The six aspects of service variously reported on by the government-owned railways are:

- train punctuality (arrival on time according to a schedule)
- care of cargo
- *customer satisfaction*
- availability of rolling stock
- delivery of cargo
- turn-around time of customers' trucks delivering cargo to terminals.

Punctuality

Both the BIE and the Steering Committee publish punctuality statistics for each system (table 2.1). In compiling the figures in table 2.1, a train was counted as 'on time' if it arrived within 30 minutes of schedule, although Westrail started using a 15 minute delay as the benchmark for its intrastate trains in 1995 (Westrail 1995, p. 52).

A shortcoming of the published punctuality figures is that they show only the overall average for all freight trains on all routes, including services carrying containers, trains carrying bulk freight such as wheat or coal, and private trains operating for individual firms between private sidings.

A second problem is that railways base punctuality statistics on 'train arrival' times rather than on 'cargo availability' times. The two are not the same. After a container train arrives at a terminal, the wagons still have to be put in place for unloading, and the cargo checked against the manifest, before containers are declared available for collection by consignees.

Even if a train arrives on time, the processes of positioning wagons for unloading and checking the manifest can cause delays in making the cargo available to customers. Because they are based on arrival times, current punctuality indicators do not pick up any delays within terminals. Indicators based on cargo availability times would provide a better measure from the user's perspective.

In particular, indicators based on cargo availability times would give a better measure of customer satisfaction for terminals and private sidings which close down overnight or at weekends. For such terminals, train

TABLE 2.1 PUBLISHED INDICATORS OF SERVICE QUALITY, 1993–94

	QR	*SRA*	*V-Line*	*Westrail*	*AN*	*NRC*
Punctuality (%)[a]	50.0	85.0	78.0	70.0	65.1	61.0
Cargo care (c/$100)[b]	2	2	na[c]	0	3	na

na Not available

a. Percentage of trains on time, that is, arriving within 30 minutes of schedule.

b. Number of cents paid for lost or damaged cargo per $100 in freight revenue.

c. In 1991–92 the V-Line figure was 30c/$100.

Source BIE 1995a, p. 37 and Steering Committee 1995, pp. 277–319.

arrival times can give a misleading measure of punctuality. For example, a train to a private siding might be scheduled to arrive at 2 am but not be required for unloading by the customer until 7 am, when factory staff start work. (This is referred to as the 'placement time' requirement.) A train arriving at 4 am would be counted as late in railway statistics but perceived as on-time by the customer because the cargo was available at the required time.

The NRC has now begun to measure cargo availability statistics for each of its intermodal terminals and each of its SteelLink services. Aggregate measures will be published in future annual reports (NRC, pers. comm., 10 December 1996).

Care of Cargo

The BIE publishes data showing the ratio of the amount paid by railways for lost or damaged cargo to revenue received for freight. In the early 1990's, the value ranged from one cent per $100 revenue for Westrail to 30 cents per $100 revenue for the V-Line. Table 2.1 gives values for 1993–94.

The BIE attached two caveats to these figures (BIE 1995b, p. 45). First, the amount of loss or damage varies with the mix of cargo carried. The greater the proportion of bulk cargo carried, the lower will be the rate of cargo loss or damage. For example, State systems which carry large volumes of bulk freight reported payments for cargo damage of only a few cents per $100 of revenue in 1993–94. By contrast, the NRC, which carries mainly non-bulk freight, has a target of reducing its loss and damage claims to less than one per cent of revenue (NRC 1993, p. 36); that is, to less than 100 cents per $100 revenue.

The second caveat is that the damage claims paid by railways will be affected, in part, by their legal liability. For many of their services, railways effectively 'contract out' liability, with the conditions of carriage making consignors bear most loss or damage costs, and limiting rail's liability to specific conditions. Rail payments to customers therefore probably understate the actual value of lost or damaged cargo. As far as the BTCE is aware, comprehensive statistics are not available showing the value of losses borne directly by customers (self insurance) or claimed from insurers. (NRC has only recently begun to keep records as part of a campaign to control damage to containers.)

For assessing cargo damage, forwarders suggested that a quality of service indicator should show the number of incidents of damage and the value of each. Both are needed. A value figure alone would not show whether cargo damage comprised a large number of incidents of low value or, at the other extreme, one or two incidents of very high value.

Queensland Rail is the only operator to publish the results of customer satisfaction surveys in its annual reports. On a five-point scale, it reported scores of 3.8 and 3.7, respectively, for its Express Freight and Q-Link services in 1994–95 (Queensland Rail 1995, p. 3). QR's report does not specify how the indicator is calculated.

Availability of Rolling Stock

Two systems, NRC and Queensland Rail, report on availability of rolling stock. NRC also reports on availability of cargo handling machinery in its terminals. Queensland Rail has, in some annual reports, given average availability figures for its electric and diesel locomotives and for the wagons used to carry minerals and coal (Queensland Rail 1994, p. 25), although its annual report for 1994–95 gave only targets for 1999–2000 (Queensland Rail 1995, p. 23). Similarly, the NRC reports on the availability of wagons and cargo handling equipment at its terminals (NRC 1995b, p. 4).

The BTCE understands that availability figures indicate the time the rolling stock is in service, in operating condition.

While rolling stock obviously needs to be in working order to be of use, availability indicators nevertheless do not give a useful measure of the quality of service. An empty and serviceable wagon in north Queensland would be counted as 'available' in QR statistics, even while customers in Brisbane were facing a shortage of wagon capacity on the next northbound train.

From a customer's perspective, the need is for an indicator that measures the availability of wagon capacity when and where it is needed for consigning freight, whereas the published indicators merely show what percentage of the fleet is operational or in the workshop for repairs or maintenance. The availability indicators currently published help management ensure how much rolling stock is in working order, but they do not show if adequate capacity is actually being delivered to customers.

Development of an indicator based on wagon space availability involves problems that can be illustrated by developments on trans-Australian services in 1995. Before NRC, extra wagons would be added to the rail service between Melbourne and Perth to meet demand: a second train would be run if necessary. NRC policy, however, was to run fixed-length trains, albeit with greater frequency. Even so, during 1995, freight forwarders found that the new arrangements provided too much capacity on the first few services of the week and not enough when demand peaked at the end of the week.

The options for developing an indicator of wagon capacity are to base it on either (i) the supply of wagon space, or (ii) the demand for wagon space.

- A supply-based indicator would measure the difference, if any, between the capacity promised by the operator and the capacity actually provided.[1]
- A demand-based indicator would measure the difference between customer demand and actual supply.

Neither a supply- nor a demand-based indicator is fully satisfactory. For example, if NRC scheduled and supplied a train with capacity for 90 containers, a supply-based indicator would suggest a perfect level of service. However, if customers had sought 100 containers, a demand-based indicator would say the same service was deficient.

A demand-based indicator would show the standard of service as perceived by customers but might be somewhat unfair in that it would report shortfalls of wagon capacity which the rail operator had never promised to provide. There might also be difficulties in compiling a demand-based indicator. A supply-based indicator would be less accurate in measuring customer satisfaction but would show if the rail operator delivered the promised amount of capacity.

A further complication is that, for fixed-length trains, the rail operator might not always be entirely to blame for capacity shortages. For example:

- NRC sometimes has to reduce the number of containers carried by a train to meet its maximum weight limit. Trains leaving Melbourne

1. The NRC compiles weekly statistics on the number of containers 'left behind' at each terminal and uses them as a proxy for capacity shortages.

for Perth have a capacity of about 90 container slots and 2000 tonnes. If the weight limit of 2000 tonnes is reached with 80 containers, then the train has to run with 10 empty container spaces.

- In 1995, apparent shortages were caused by some forwarders making block bookings but not using all the space. If they did not deliver enough cargo, the train left with empty wagons while other companies with cargo were not able to get space. As discussed in chapter 3, NRC initiatives have largely solved this problem.

Similarly, availability indicators for terminal equipment show what percentage of the machinery is, on average, in working order and available for use, not the standard of service given to customers. Indeed, in some circumstances, there might be no direct relationship between equipment availability and service standards. For example, even if all machinery is operational, terminal management might decide to concentrate all resources on loading a train about to leave, at the expense of customers' trucks waiting to collect containers. From the viewpoint of customers, the time taken by their trucks to pick up and deliver cargoes at rail terminals is a far more relevant indicator of service standards.

Delivery of Cargo

Westrail (1995, p. 52) is the only railway that currently publishes an indicator designed to measure its performance in carrying bulk freight. For cargoes of woodchips and grain, its 'delivery performance indicator' shows the ratio of tonnes delivered to tonnes ordered. The delivery performance indicator has replaced a freight satisfaction index and is now one of Westrail's main performance indicators.

Truck turn-around times

Terminal efficiency, as measured by the turn-around times for trucks delivering or collecting containers, is a matter of intense interest to rail freight forwarders because it is one of the key factors determining the efficiency of their operations and hence their profits. Inefficiency in terminal operations can disrupt the overall operations of a forwarding company, in addition to increasing the actual costs for trucking containers to and from customers. Terminal efficiency is discussed further in chapters 3 and 4.

The NRC is the only rail system that publishes an indicator of truck turn-around times at terminals. The indicator is based on the time taken by the 90th percentile of trucks. In its 1993 Statement of Corporate Intent, the NRC initially adopted a target turn-around time of 30 minutes (NRC 1993, p. 36), a figure later increased to 45 minutes (NRC 1995e, p. 5). The measured indicator was 61 minutes in December 1993, increased to 72 minutes in December 1994, then fell to 38 minutes in June 1995.

For some cities, a shortcoming of indicators of truck turn-around times is that they do not include the time trucks spend in queues outside the terminal gate. Rather, the indicator is based solely on the time elapsed between entering and leaving the terminal. Where queuing occurs outside terminal gates, the NRC indicator can understate truck turn-around times as seen by the customer.

Another shortcoming of the published figures is that they are only overall averages. They give no indication of how delay times vary between peak and off-peak times during the day, or from day to day during the week. Nor do they show the variability in truck turn-around times.

Chapter 5 of this report shows that average truck turn-around times in Melbourne vary with other factors, including (i) the number of containers carried to and from the terminal per round trip, (ii) the type of containers carried, and (iii) the number of trains visited on each trip.

Other service characteristics

None of the rail systems publishes indicators of billing accuracy or short shipping, both of which were identified as problem areas by forwarders. It was suggested that a service indicator of billing errors could be compiled by counting the credit notes issued by railways to customers, possibly analysed to show the causes of errors, such as clerical errors, fees imposed in error, or bills sent to the wrong company. For short shipping, forwarders suggested a count of the number of containers not taken by the trains on which they were booked, plus the number of units sent to the wrong destination.

To be meaningful, both indicators need to be expressed as a percentage of total container consignments.

COMMENT

Most rail systems publish insufficient information to indicate the quality of service they are providing. Service indicators should ideally cover all aspects of service likely to affect customers' utility. Focusing on one or two service characteristics might not be sufficient. With the exception of NRC, railways publish only one or two service indicators and these are generally designed to monitor the performance characteristics of the rail system rather than satisfaction of users' needs.[2] Published indicators are also too aggregated, showing, for example, the punctuality performance of all freight trains operated by a system. They would be more usefully focused on problem areas and areas of customer interest. For rail freight, this suggests separate indicators for services such as container trains, trains carrying bulk cargoes, and industrial trains or trains operating between private sidings. However, to be useful to individual customers, indicators would have to be published for each route and freight terminal.

Indicators currently published show only overall annual averages and give no indication of smaller-scale temporal variations in service standards. They do not show if train delays vary from day to day during the week, whether truck turn-around times blow out at peak hours, or if service standards change with the seasons. NRC is a partial exception because the indicators published in its annual report analyse performance by quarter.

Absence of standardisation in the service indicators published by government railways effectively precluded detailed comparisons between systems. There is some standardisation in the financial and economic indicators published by railways because they follow similar accounting standards and guidelines for GTE reporting, but there are no comparable standards for reporting on service quality.

Indeed, when the Steering Committee began monitoring railways in 1991, it found that there was only one service quality indicator that could be provided by all systems for freight: train punctuality. By 1996, there was just one more, the indicator of cargo care published by BIE.

2. Most, if not all, railways also compile other indicators which are not published. For example, NRC compiles a large number of indicators on service quality, productivity and safety, but only publishes a few 'top level strategic indicators'. (NRC, pers. comm., 10 December 1996).

It seems that a problem common to most of the published indicators is that they were not originally designed to measure service quality as perceived by customers, but rather to provide feedback to railway managers. The punctuality indicators do not show if customers received freight on time, only if the trains were late in moving off main lines into terminals; the wagon availability indicators don't show if cargo capacity is adequate for customer needs, only if the rolling stock is in working order; and the cargo care indicators don't show the amount of freight actually damaged, but only some lesser amount for which railways have actually paid compensation.

CHAPTER 3 DEVELOPMENT OF INDICATORS THAT REFLECT CUSTOMER NEEDS

After reviewing the published data, the BTCE drafted a list of rail service characteristics for discussion with rail operators and customers.

SELECTION OF INDICATORS

About forty rail service characteristics were initially identified from various sources including academic and trade journals, and discussions with consignors and transport operators. Because this number was too large for a survey, the list was reduced to the seventeen in box 3.1 using *inter alia* the criteria described in the next paragraph, while the characteristics deleted in the short listing process are listed in box 3.2. In retrospect, the reduced list in box 3.1 seems to have covered most of the areas of interest to freight forwarders.

To be selected for the survey, service characteristics had to be:

- under the complete control of railways. Characteristics concerning the quality of containers and pick-up and delivery services were excluded because, in Australia, these are the responsibility of freight forwarders and transport operators.
- likely to vary. Rail customers are very interested in the weight and volume limits imposed on wagon load consignments, but there is little point in monitoring these characteristics because they remain constant from year to year unless the track is upgraded.
- relevant to most customers. Consignors shipping refrigerated cargo are interested in whether the rail system supplies electricity on trains to operate refrigeration units, and in the standard of cargo supervision en route, but they comprise a minor percentage of rail customers, and so these characteristics were excluded.

- of high priority to most customers. Transport operators advised the BTCE that some of the indicators in the original list would be seen as irrelevant or of low priority by most customers. For example, pilferage is probably a trivial problem for customers shipping containerised freight.

- capable of being measured by an objective rather than a subjective service indicator (staff quality being the exception).

Objective service indicators are those which can be measured directly. For example, the number of trains per week is an indicator of service frequency and the percentage of trains arriving on time is an indicator of punctuality. For other service characteristics, however, the standard of service is literally a matter of subjective customer opinion—such as the 'image' of a transport company or the level of 'initiative' taken by its staff—which can only be measured by survey questions. Queensland Rail's index of 'customer satisfaction' is a subjective indicator of service quality but the other indicators discussed in this chapter are based on objective measures.

BTCE (1991, p. 55) observed that regulatory authorities tend to use objective indicators because they have the advantage of being consistent over time, whereas subjective indicators may be influenced by external factors and personal idiosyncrasies. Where service indicators are used by government to assess the performance of a GTE or to set targets for it, they should, wherever possible, be objective.

Four service characteristics to do with staff quality were considered in the original list: friendly and cooperative; efficient and knowledgable; take initiative in looking after interests of customers; and keep customers informed of changes to freight rates and service. These were condensed to one question in the survey itself, the aim being to measure the overall importance of staff relative to all other aspects of service. On *a priori* grounds, staff quality seems to be an important but complex aspect of service which, at a later date, might justify a survey on its own.

Staff quality is a complex aspect of service because there are multiple levels of contact between rail operators and customers, with freight rates and conditions being negotiated at management level, followed by day to day contacts between operational staff; it is also multi-dimensional, with customers assessing rail staff on their levels of knowledge, initiative, and level of cooperation.

BOX 3.1 SERVICE CHARACTERISTICS INCLUDED IN BTCE SURVEY OF FREIGHT FORWARDERS

Quality of Staff

- Staff quality as measured by efficiency, knowledge and initiative

Information

- Ease of access to information on train operations and cargo location
- Response times in answering telephones at rail terminals

Quality Accreditation

- Rail system meets formal quality accreditation standards

Reliability

- Punctuality: arrival on scheduled time (or within say 30 minutes)
- Service delivery; percentage of scheduled trains not cancelled

Equipment

- Wagons available when needed

Care of cargo and equipment

- Care of cargo as measured by damage to equipment

Time characteristics

- Departure time from origin at a convenient time of day
- Arrival time at destination at a convenient time of day
- Speed; transit time from origin to destination
- Frequency: number of services per day or per week

Booking and invoicing

- Invoicing accuracy and efficiency
- Cargo booking procedures, ease and efficiency

Terminal operations

- Terminal efficiency, as measured by truck turn around times
- Operating hours of terminals

Recovery ability

- Efficiency in solving problems eg derailments, accidents, or lost cargo

BOX 3.2 SERVICE CHARACTERISTICS NOT INCLUDED IN BTCE SURVEY OF FREIGHT FORWARDERS

Equipment

1. Availability of containers
2. Condition of equipment, eg cleanliness, external appearance
3. Ability to supply special equipment
4. Equipment suitable for palletised freight

Weight and volume limits

5. Maximum weight allowed per wagon
6. Maximum volume of wagons/containers

Security and care of cargo and equipment

7. Security against theft or pilferage
8. Supervision to guard against deterioration en route
9. On-board electricity supply (for refrigerated containers)

Claims processing

10. Prompt and efficient processing of claims for damage

Cargo tracing

11. Ability to trace location of cargo en route and give ETA
12. Availability of freight information via on-line computer access (EDI)

Flexibility

13. Ability to accept cargoes at short notice
14. Ability to ship cargoes to unusual destinations
15. Ability to change destination en route

Quality of staff and management of transport company

16. Staff friendly and cooperative
17. Staff efficient and knowledgable
18. Staff take initiative in looking after interests of customers
19. Staff keep customer informed of changes to freight rates and service

Service standards

20. Operating hours of staff in transport operator's office

Public image of transport operator

21. Transport company has a good image with the public
22. Trucks/wagons are well painted and look good
23. Shipper can display advertising on transport vehicle

Network size

24. Number of cities to which cargoes can be sent
25. Terminals in or near destinations

Pick up & delivery

26. Punctuality of pick-up
27. Punctuality of delivery

SURVEY OF FREIGHT FORWARDERS

In order to test the validity of its list of quality of service indicators, the BTCE interviewed major freight forwarding firms to gauge their perceptions of the most important indicators.

The interviews took place in the latter half of 1995. Results are presented in chapter 4. Appendix III gives further detail, an analysis of the respondents' characteristics and a discussion of the role and importance of freight forwarders.

The BTCE's field research concentrated on forwarders because they comprise a small group of companies with extensive, first-hand knowledge of rail service quality from the viewpoint of customers. Because they deal directly with rail operators, forwarders know more about rail service quality than most of the consignors for whom they carry freight.

The forwarding industry's opinion on rail service quality is a also a matter of importance in its own right. Forwarders effectively make the mode choice for virtually all less than full container load (LCL) cargoes plus a significant percentage of full container load (FCL) consignments. For the rest of FCL market, the choices made by consignors between road and rail are influenced by the prices and service standards quoted for each mode by their forwarders.

According to the NRC, virtually all of the freight on their intermodal services is consigned via rail freight forwarders (pers. comm., 4 July 1996), most of whom are included in the ten respondents to the BTCE survey in box 3.3.

BOX 3.3 SURVEY RESPONDENTS

Brambles Australia Ltd

Incitec Ltd, trading as Chemtrans

CRT Bulk Haulage

FCL

Finemores Vehicle Transport

K&S Freighters

Railor[a]

Sadleirs

Specialised Container Transport

TNT Australia General Transport Services

a. The BTCE also collected information from Interlink, a subsidiary of Mayne Nickless which was purchased by Railor just before these interviews.

Source BTCE survey of rail freight forwarders, 1995.

CHAPTER 4 FREIGHT FORWARDERS' VIEWS ON THE QUALITY OF RAIL FREIGHT SERVICE

In carrying out its survey, the BTCE asked forwarders (i) to discuss the importance of rail service quality and the problems faced by customers if it did not meet required standards, and (ii) to complete a questionnaire giving information on their company's operations and their opinions on the relative importance of selected aspects of rail service quality. Each forwarder was interviewed separately, the respondents being senior managers with experience in operations.

DESIRABLE CHARACTERISTICS OF RAIL SERVICE

Punctuality

Punctuality is critical to forwarders. Everything hinges on arrival times, with late trains causing problems that may snowball through the day, affecting both forwarders and their customers. From a forwarder's viewpoint, trains do not have to be fast, but they must be on schedule: where trains are often late, variability in the length of the delays is also important.[3]

Modern freight forwarding works to a time-table. Collection of containers from consignors is often by appointment and, at the destination, forwarders have to book times for delivering cargoes to warehouses. Warehouse managers aim to keep cargoes arriving at a steady rate during the day, avoiding peaks, and keeping staff fully employed. For both forwarders and warehouse managers, this entails

3. The causes of NRC punctuality problems include a high rate of locomotive failures, temporary speed limits on tracks, and out-of-course running by other carriers' trains that have missed their scheduled time-slot and are running behind schedule (NRC, pers. comm., 10 December 1996).

detailed scheduling, and matching of resources (labour, trucks, containers and fork lifts) to demand.

A late train poses a double risk of cost increases. With sufficient forewarning, forwarders try to re-schedule their trucks and labour to other jobs (or cancel bookings for sub-contractors). If this is not possible, the resources will be left idle. When a late train eventually arrives, the reverse problem is faced. The forwarder has to re-schedule trucks and labour to move the cargo or, if they are fully employed on other jobs, hire extra resources.

Late trains often put forwarders under pressure. The customer wants the cargo, the forwarder needs the containers for other jobs, and the railway charges demurrage for containers left too long at the terminal. No forwarder can afford full-time employment of extra resources just to handle peak demand, and diverting existing resources risks delays to other cargo. At busy times, forwarders therefore often hire extra trucks to deliver late containers that they would otherwise handle by relying on their own resources.

Customers face similar problems. Warehouse managers have to schedule their staff and equipment to unload and stack incoming cargoes. When containers arrive late, they face an initial risk of labour and equipment left idle, then a peak in demand. When the cargo is eventually delivered, extra resources are required. To maintain goodwill, forwarders try to give advance warning of delays so that customers can reschedule resources to minimise costs.

Once trucks are behind schedule, the delays can compound, affecting a string of customers until the end of the day or even beyond. A delivery missed at the end of the day means the forwarder may face a 'no show fee' (for booking space on a train but not delivering the container) plus an unscheduled consignment to arrange the next day. For any containers left too long at rail terminals, there is the risk of demurrage fees.

When delays occur late in the day, after the consignee's closing time, forwarders often store containers at their depots overnight, then deliver them next morning. The extra trucking costs about $50 per hour per sub-contractor, and the extra cargo handling about $20 per container lift. Similar problems are faced in delivering export containers to wharves, where forwarders must book delivery timeslots and risk 'no-show' fees for slots booked but not used.

Forwarders can often make up time by hiring extra trucks but there is no guarantee that they will always be available. When major delays occur, several forwarders might be in the market for sub-contractors at the same time, with the market having insufficient resources to meet all demands. Hiring specialist resources can be particularly difficult because the supply is limited. For example, for containers of dangerous chemicals, regulations require forwarders to use low-loader trailers and drivers with special safety qualifications (Federal Office of Road Safety 1992).

Train delays also affect container utilisation. In peak periods, forwarders aim for one-day turn-around times, collecting a container from an incoming train in the morning, taking it to the consignee for unloading, then to a consignor for loading and return to the terminal in the afternoon. If quick turnaround is not possible, forwarders have to buy or hire extra containers.

In addition to increasing operating costs, continuing punctuality problems reduce the standard of service, and hence the price that customers are willing to pay for rail transport. This reduces forwarders' profits from rail, perhaps inducing them to switch to road or sea.

Late trains can increase costs faced by customers in other areas.

- If punctuality is a frequent problem, customers may hold extra stock as insurance against trains arriving late. They pay interest on the working capital invested in the extra stock plus the cost of extra storage capacity which is high for commodities such as refrigerated food and chemicals.
- Reliable transport is essential for factories using 'just-in-time' methods and for warehouses practising 'cross-docking'[4] distribution, where late deliveries increase costs or cause shut downs.
- For shipments of cars, retailers must reschedule the work of the staff who prepare vehicles for delivery, then notify each customer of the delay. Given the financial and emotional commitment of buying a new car, delays affect customer relations. Deliveries usually cannot be made from stock because a high proportion of Australian-built cars come with options ordered by individual customers.

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4. In cross docking, cargoes are transported by road or rail, taken to a warehouse, then transferred directly across the loading dock to local delivery vehicles, without being stored in the warehouse shelves. Like just-in-time operations, this requires punctual transport. Cross docking is used by parcel delivery firms and possibly by some distributors.

Quality of staff

Forwarders deal with railways at several levels, negotiating freight rates with marketing staff, arranging consignments with operations people, and transferring containers to and from terminal operators.

In general, forwarders considered that rail staff with whom they dealt should have sufficient knowledge of operations to give immediate answers to customers' questions, to spot problems and to work out solutions. Inadequate knowledge causes delays and hence increases costs.

Several forwarders emphasised the need for rail terminal staff to develop a high level of skill and expertise in driving cargo-handling machinery. Lack of skill leads to damaged equipment and cargo. It was also suggested that, within reasonable limits, rail staff should have the authority to make decisions on matters within their area of responsibility. Delays in decision-making by rail staff slow down dealings between forwarders and their customers.

Access to information

Freight forwarding is an information-intensive industry. To a large extent, the efficiency and service quality of rail forwarders depend on their access to information about train operations. Whereas forwarders can usually make direct contact with truck drivers by phone or radio, they depend on rail operators for information on train movements. (Some customers now have direct access to the NRC computer.)

Forwarders need access to information on rail operations so as to:

- plan the efficient deployment of their staff, trucks, and containers;
- make arrangements with customers for the pick up and delivery of cargoes; and
- initiate 'damage control' action to solve problems such as breakdowns or delays. To maintain goodwill, customers must be informed as soon as possible but this can often be a major task. While it may need only one phone call per container for FCLs, dozens of calls may be needed when containers in the LCL trace are delayed. (One forwarder who responded estimated that there are consignments from 50 customers in a typical container of its LCL freight, and sometimes up to 200.)

If rail systems do not provide adequate data, forwarders sometimes resort to developing their own information systems. This involves keeping extra records, increased communications between depots, and costs in staff time to monitor train operations.

Forwarders noted that railways are moving to flatter management structures that result in key people being harder to contact. The problem has been alleviated only partly by mobile phones and it was suggested that railways should have someone acting as a communications hub. One forwarder noted that it looks to the customer as though the forwarder has no control if he cannot contact key rail personnel to solve problems.

Quality accreditation

None of the forwarders interviewed placed much importance on formal quality accreditation. Nevertheless, they agreed that good customer service is essential for commercial success and that this involves giving customers what they want and having management checks in place to trigger remedial action if things go wrong.

Two exceptions were noted: some customers require their transport operators to have formal quality accreditation, and government regulations require transport operators to employ specially qualified staff for handling dangerous or hazardous cargoes (Federal Office of Road Safety 1992).

Equipment: wagons available when needed

Lack of wagon capacity has an effect similar to train delays, except that the forwarder may receive advance notice of the problem. When faced with wagon shortages, forwarders often switch cargoes to road transport.

Capacity shortages can result from railways having insufficient wagons or not using their wagons efficiently. In practice, efficient use of containers means returning empties quickly to freight-consigning centres. Both causes were mentioned in the NRC's 1994–95 Annual Report which stated that lack of efficient capacity to carry freight had been a significant problem for customers during the year, and reflected under-investment (in wagons) in past years. The report went on to say that available capacity had been increased by intensified management of wagon resources after NRC took over the job of wagon deployment towards the end of 1993–94 (NRC 1995b, p. 12).

Forwarders also suggested that the wagon capacity problems of 1995 were exacerbated by changes in rail operating practices, particularly on the Melbourne to Perth route where demand for space usually peaks at the end of the week. In previous years, rail operators had responded by adding extra wagons to trains, or even by running a second service. NRC practice, however, was to run fixed length trains, albeit with greater frequency, which resulted in capacity shortages at the end of the week.

Some forwarders responded by making permanent block bookings, effectively tying up capacity so that other forwarders encountered difficulties in booking space. The problem was eventually ameliorated, partly by NRC imposing a 'no-show' fee for container slots booked but not used (bookings must be confirmed about a day before departure), partly by discussions with forwarders, and partly by a new freight rate schedule which penalised over-booking. Capacity shortages still occur but the problem is less serious.

While wagon space was a major problem in 1995, some forwarders regarded rail as suitable only for regular consignments, automatically sending one-off shipments and abnormal increases in regular shipments by road.

Short shipments

Forwarders responding to the BTCE survey suggested that 'short shipping' should be added to the list of service characteristics in box 3.1. Short shipping is a maritime industry term for containers which are accepted for transport but are not taken by the ship (or train) on which they are booked, or are sent to the wrong destination.

Short shipping is rarely caused by wagon shortages because rail operators accept cargo bookings only for the capacity available. It is usually caused by mistakes at the terminal or by operational problems. For example, containers accepted for transport have to be left behind:

- if wagons in a train are 'red-carded'—declared unfit for operations—and replacements cannot be found in time. Forwarders sometimes deliver containers to a terminal, see them loaded on the train, and later hear that wagons were red-carded and their cargoes left behind.

- if the mass of cargo booked is found to exceed the maximum weight limit of a train. (It is possible for the weight limit of a train to be reached before all container spaces are filled.)

The effect of short shipping is similar to a train delay, albeit with the extra risk that forwarders might not find out about the problem until they seek to collect the containers at the destination, too late to take remedial action.

To avoid this problem, some forwarders check to ensure that their cargoes are not left behind, with a staff member permanently stationed at the terminal or making several trips to it each day. Costs increase commensurately.

Cargo booking procedures

Forwarders were generally happy with arrangements for booking cargo space on trains and optimistic that procedures would improve with increased computerisation. Nevertheless, they identified two problems.

First, forwarders want an immediate and certain answer when they book container slots on a train. At present, bookings are provisional until the total weight of cargo consignments from all customers is known. If the weight of total cargo bookings exceeds the train's capacity, containers have to be taken off the manifest to meet the limit.

This causes inconvenience if forwarders have to arrange alternative road transport for priority cargoes at the last minute, or worse, if containers are left off the train without the forwarder being told. The problem can be ameliorated by consulting forwarders to ensure that only low priority containers are taken off. (The BTCE understands that this problem will be solved with new booking procedures and computer systems being introduced by both NRC and forwarders.)

Second, forwarders suggested that the booking system be modified to mitigate the problems of over-booking described in the section on wagon availability.

Care of cargo and equipment

Damage to containerised rail freight can be caused by shaking and vibration en route, and during shunting and cargo handling (lifting of containers by cranes, fork lifts or reach-stackers).

Forwarders identified cargo handling in terminals as the time during which the most serious damage was caused. Modern railway practices avoid or minimise shunting, while damage in transit is reduced in modern wagons designed to minimise vibration.

Damage to a container does not always affect the cargo because the strength of the container side-walls affords some protection to the contents. Nevertheless, some cargoes are at risk from even minor damage to the container. In rainy weather, cargo prone to water damage can be at risk from even a small hole in the container roof.

To maintain customer goodwill, forwarders sometimes pay for damage to cargoes, even if they are not legally liable. The BTCE understands that railways are liable for cargo damaged en route only in specific circumstances, or if liability is specified in a contract. Forwarders and consignors must either insure their cargoes or meet their own damage costs.

In addition to repair costs, the risk of damage forces forwarders to invest in extra containers to substitute for units out of service for repairs. The reserve units require additional capital and involve operational costs, through storage, cleaning, maintenance, and certification.

The costs of damage are relatively greater for specialised containers, such as refrigerated units or tautliners,[5] or where equipment is dedicated to a specific customer. In percentage terms, the size of the reserve required for a small inventory of specialised containers is greater than for a large fleet of ordinary dry containers and, if damaged, they cost more to repair.

The transport of cars was the only other significant issue in cargo care raised by forwarders. Cars are shipped in open wagons and sometimes suffer from vandalism or pilfering of parts if trains are parked in sidings. For this reason, car manufacturers prefer trains which move direct from origin to destination without stopping.

5. A container with sliding fabric curtains on each side. The curtains can be opened for quick loading and unloading from the side of the unit, then closed during transport.

Departure and arrival times

In addition to punctuality, four time-related characteristics of service quality were discussed with forwarders: train departure time from the origin, time of arrival at the destination, speed, and service frequency.

For time-sensitive consignments, there is a significant demand for trains departing as late as possible in the day and arriving at the destination in the early morning. This allows consignors to pack containers in the morning, then consign them to the rail terminal for departure in the late afternoon or evening. For deliveries between adjacent cities, this permits next day delivery.

Concentrating train departures at the end of the day can, however, cause congestion problems. The number of trucks delivering containers to the rail terminal will peak in the late afternoon, bringing the risk of long queues and delays. Nevertheless, customer demand for late departure times reflects commercial realities: most factories work normal hours and, in some industries, they often receive orders requiring quick deliveries.

At the other extreme, forwarders suggested that some customers could adapt to any reasonable departure and arrival times, provided that transit times were acceptable and trains were punctual. As a generalisation, cargoes for which departure and arrival times are not critical are also less time-sensitive. They include building materials, raw materials for factories, and goods going to city warehouses.

A third view was put for LCL consignments. Forwarders can deliver FCLs direct from consignors to the rail terminal on the same day, but LCLs move more slowly. Forwarders collect LCLs from consignors, then take them to a depot for consolidating into full container loads, taking care to use the full weight and volume capacity of the container so as to minimise costs.

This takes time, and LCL cargo is often not ready to be shipped out until just before midnight on the day of its collection, with a wait of twelve to eighteen hours before the next train. For this reason, forwarders specialising in LCL cargoes stated that, on routes between eastern cities, they would prefer trains leaving late at night or early next morning. The evening departure time common for most trains, while meeting the demand for the FCL trade, is too early for LCL specialists. This may be a reason why the LCL trade uses road transport between eastern cities, particularly adjacent cities, with little if any going by rail.

For both FCL and LCL shipments, forwarders preferred early morning train arrival times before, say, 7am. Early arrivals allow forwarders to first collect high priority containers, then keep trucks fully employed for the rest of the day, operating a shuttle service from the terminal to consignees.

Speed

Forwarders suggested that train transit times should approximate road times, but that there was no need for high speed rail freight services. One forwarder suggested that a rail speed of 80 kph was too slow, 110 kph was about right, and that a service over 130 kph would be a waste of resources. If fast delivery is needed, cargo should be sent by road or air.

Although their maximum line haul speeds are about the same, road is often faster than rail because trucks can leave immediately on completion of loading and go direct to the consignee's premises, whereas trains have to wait for their scheduled departure time.

Nevertheless, forwarders identified the following worthwhile benefits from any marginal reductions in transit times that might be effected by faster trains or track improvements:

- later cut off times for accepting cargo; for example, if cargo has to be delivered to the rail terminal by 5 pm, a one hour cut in transit time might allow cargo to be accepted up until 6 pm with the same arrival time at the destination. NRC's annual report for 1995 (NRC 1995b) noted that track and signalling improvements on the Melbourne to Adelaide line would allow later cut-off times for intermodal trains to Perth.
- earlier arrival time; on some routes, trains arrive during the day, at around 10 am. For some cargoes, rail would become more competitive with road transport if trains arrived by, say, 7am.

Frequency

Forwarders generally advocated daily services on major routes, provided demand is adequate. Daily services tend to smooth-out cargo movements, making efficient use of trucks and staff, and avoiding cargo peaks which require extra resources that may at other times be under-employed.

Any significant cut in service frequency means that, all else being equal, consignees have to increase their inventory holdings, with associated increases in working capital and storage costs. The capital costs of storage facilities can be quite high for commodities such as chemicals and refrigerated food.

Less than daily services may also entail extra cargo handling for customers who cannot store on their premises more than one days stock. The forwarder will pick up containers from the rail terminal, store them at a depot, and make a daily delivery to the customer as required. The overall result is a need for more storage space, more containers, and more handling. Further, the more steps involved in any operation, the more people are needed to manage and implement it.

Forwarders also said that any drop in service frequency would see trade transferring to road or sea. Road competes with rail on all routes, while foreign ships carrying cargoes under single voyage permits are an attractive alternative between the eastern States and Perth. These vessels are reputed to charge competitive freight rates and provide excellent cargo handling service (and low damage levels), albeit with low speed and less frequency than either road or rail.

Forwarders' overall preferences seem to be for daily services on major routes with trains scheduled to leave as late as possible in the day, arriving at their destinations early in the morning.

Invoicing accuracy and efficiency

Forwarders often have to correct invoices for rail freight, at significant cost.

Forwarders reported an unacceptably high level of errors in invoices in late 1995 but consider that increased computerisation of billing systems will reduce the problem. In addition to simple clerical mistakes, errors have been caused by rail staff:

- recording the wrong weight for containers — when a trailer takes two containers to the rail terminal, the total weight of the two is sometimes recorded for each unit;

- sending bills to the wrong company, a problem that sometimes occurs when containers are hired between forwarding companies, the bill being sent to the owner of the unit rather than the shipper of the freight; and
- incorrectly imposing no-show fees or demurrage charges.

Terminal efficiency: truck turn-around times

All forwarders agreed that terminal efficiency is one of the more important characteristics in assessing the quality of service provided by rail transport.

Trucks are a major asset for forwarders and their time has to be managed to maximise the number of loads carried. If terminal operations slow down, forwarders incur extra management and planning costs, even if this involves no more than frequent monitoring of each truck's position and status. The risk is that deliveries to the rail terminal will be missed at the end of the day, resulting in a one-day delay for some containers.

Terminal efficiency also affects container utilisation. Forwarders do not hold an unlimited supply of equipment. At times of peak demand, they seek to turn around containers in one day, collecting incoming boxes from the rail terminal in the morning, taking them to the consignee for unloading, then to a consignor for loading, and back to the terminal for an evening train. The job is made somewhat easier because some incoming containers are empty, the proportion varying according to the route. On the other hand, refrigerated containers must be cleaned (pre-tripped) before loading with food.

Forwarders respond to terminal delays by hiring more trucks. This gives them increased pick-up and delivery capacity, but at a cost of about $50 per truck per hour plus management and administration costs.

Even the threat of delays at terminals can increase costs. Some forwarders hire additional trucks whenever they foresee a risk of delays, such as times of peak demand. In the latter part of 1995, some forwarders in Melbourne were hiring extra trucks from sub-contractors every morning. If terminal delays developed in the first few hours of operation, the trucks were retained for the rest of the day; if not, their hire was terminated mid-morning.

Operating hours of terminals

Terminal opening hours are important because they affect the efficiency of truck operations. The longer the hours of opening, the more intensively can trucks be used, allowing them to make more pick-ups and deliveries each day. With registration and capital costs being fixed and fuel and wages the only significant variable costs, this can translate into increased profits.

Forwarders praised the arrangements at NRC's Dynon terminal in Melbourne which is open twenty-four hours a day. To make the best use of longer terminal hours, forwarders seek to persuade customers to operate longer hours, at least for despatching and receiving cargoes, or to adopt other innovations. For example, the chemical industry is experimenting with the concept of 'driver-loaders', under which truck drivers have out-of-hours access to customers' premises to load or unload chemicals.

Recovery ability: efficiency in solving problems

'Recovery ability' was defined as the ability to solve problems such as derailments, the loss of a container, or short shipping.

When asked to comment on the importance of 'recovery ability', most forwarders discussed it in relation to rail accidents. Although major accidents occur only rarely on inter-city services, forwarders said that it was important to have an accident recovery plan in place, rather than be forced into making ad hoc decisions at short notice. Proper planning to deal with accidents will minimise costs and loss of customer goodwill.

If an accident occurs, the forwarder needs access to information so that customers can be told about the delay, the prognosis for recovery, and possible solutions. Some customers may be content to wait until their cargo can be retrieved but others will need to order immediately a substitute shipment. (Urgent shipments are usually sent by road on eastern routes but rail is often used to Western Australia.)

In the event of an accident, NRC practice is to appoint a customer liaison officer who issues bulletins on the current status of the problem and expected resumption times. The bulletins are sent by fax to each customer every six hours, or when there is a change in status (NRC, pers. comm., 10 December 1996).

Similar problem-solving skills are needed when individual shipments are left behind at the rail terminal or sent to the wrong destination. Again, the forwarder needs to be informed quickly of the incident so that remedial action can be taken.

Service delivery: the percentage of trains not cancelled

Service delivery was defined as the percentage of scheduled trains that actually run. The Steering Committee (1995) publishes a comparable service characteristic for passenger rail operations. Nevertheless, freight forwarders said it was a mistake to include service delivery in the survey because interstate rail services were rarely cancelled at short notice.

The costs of inadequate rail service to freight forwarders and customers are summarised as in box 4.1.

BOX 4.1 THE COSTS OF BAD SERVICE

- Extra resource costs are faced when trains are delayed, initially from trucks, equipment and labour left idle, then for hiring extra resources to move cargo backlogs.
- Increased trucking, cargo handling and storage costs are faced if late cargo cannot be taken direct to the consignee but has to go to temporary storage, or if damaged containers are taken to a forwarder's depot for assessment.
- Damaged containers involve the cost of repairs plus the cost of holding extra equipment so that replacements will be available when boxes are taken out of service for repair.
- Some forwarders reimburse customers for the cost of damaged cargo.
- Staff spend time monitoring train services and terminal operations to detect problems, and to reschedule operations to adjust for any delays.
- Increased communications and record keeping if access to information on rail operations is not adequate.
- Staff time spent in checking inaccurate invoices.
- Customers need to hold extra stock as an insurance against late deliveries plus storage capacity to hold the extra stock.

Source BTCE survey of rail freight forwarders, 1995.

RANKING OF CHARACTERISTICS

In the second part of the BTCE survey of forwarders, respondents were asked to rank rail service characteristics in order of importance in determining service quality, then to allocate 100 points among the five characteristics rated highest.

The five service characteristics ranked highest in the BTCE survey were, in order:

1. punctuality of trains
2. care of cargo and containers
3. rail terminal efficiency
4. wagon capacity available when needed
5. staff quality.

Punctuality was seen as by far the most important aspect of service. The characteristics ranked second, third and fourth were accorded approximately equal importance, above staff quality ranked fifth. (Appendix III gives details of the survey and table III.4 its results.)

Taken together with forwarders' comments during face-to-face discussions, the survey results suggest that the top four characteristics should be considered for inclusion in any program implemented to monitor rail service quality. The service quality indicators by which they might be monitored are shown in box 4.2.

Two other characteristics might also be considered for inclusion. Forwarders suggested monitoring 'short shipping': that is, containers accepted for transport but not taken by the train on which they were booked. Short shipping was not included in the survey but forwarders said it was an important service characteristic. Billing accuracy did not rank highly in the survey, but might be included as an indicator if it is easy to measure on the basis of the number of credit notes issued by rail authorities to customers.

Staff quality would need to be measured by a subjective service indicator and so might not be a suitable characteristic to include in any government program that monitored rail service quality. Subjective indicators can be influenced by various factors and might not be fully comparable from year to year. (Subjective and objective indicators are discussed in the first part of chapter 3.)

BOX 4.2 SUGGESTED INDICATORS OF RAIL SERVICE QUALITY

Punctuality Delay between the time cargo is scheduled to be available for collection and the time it is actually made available for collection.

Cargo damage Number of incidents in which cargo or containers are damaged and the value of the damage.

Terminal efficiency as measured by truck turn-around times.

Wagon availability Number of container slots available on each service as a percentage of number scheduled to be available or the number requested by customers.[a]

Short shipping Number of containers left behind by trains on which they were booked, as a percentage of the number accepted for transport.

Billing errors Number of credit notes issued by the rail carrier, expressed as a percentage number of containers carried.

a. The options for measuring wagon availability are discussed in chapter 2.

Source BTCE survey of rail freight forwarders, 1995.

The BTCE is not suggesting that railways need only compile the six indicators listed in box 4.2. On the contrary, railways would need additional indicators bearing on management and marketing. For example, operations managers would still need indicators measuring train punctuality and the percentage of rolling stock in operational condition. Similarly, marketing managers would need subjective indicators based on surveys showing customer opinions about service quality standards.

COMMENT

The opinions of freight forwarders presented here give some insight into the issue of rail service quality. Some of them conflict with conventional wisdom.

Transport service quality cannot simply be measured in terms of time (speed). Neither can the cost of service quality be measured solely in terms of the opportunity cost of capital invested in inventories. (For example, the interest cost of extra stock held as an insurance against late deliveries.)

On the contrary, bad service in the form of late deliveries or damage to cargo can inflict quite significant costs on transport operators and consignors for cargoes of low value, or even empty containers. The extra costs arise from extra trucking and labour expenses and repairs for damaged containers.

This belies the view, which is sometimes put to the BTCE, that rail customers make a trade-off, accepting lower standards of service for lower freight rates. Shippers may indeed be accepting marginally longer transit times (relative to road) for lower freight rates, but it is debatable whether they would willingly accept lower standards in other service characteristics, such as cargo handling or punctuality.

Some forwarders observed that 'service quality' is, to some extent, an area of conflict between the three parties involved in sending freight; the consignor, the consignee and the transport operators. On the one hand, the three have an incentive to cooperate with each other to minimise the overall door-to-door cost of transport for their freight. On the other, they sometimes also try to minimise their own costs at the expense of forcing higher costs on to one or more of the other parties.

For example, buyers in a strong bargaining position often reduce their own costs at the expense of their suppliers and their transport operators. Purchase orders might be placed subject to quick delivery, say 72 hours between eastern cities, an arrangement that minimises the stock-holding costs of the buyer but forces the supplier to spend more on fast transport, possibly road rather than rail.

Further, the buyer might accept deliveries by appointment only, allocating delivery times through the day. By avoiding 'peaks', this arrangement minimises the resources needed to run the buyer's warehouse but it forces truck operators to bear the cost of waiting until the delivery appointment time.

Similar conflicts of interest may exist between rail operators and freight forwarders. On the one hand, rail operators and rail forwarders have a joint interest in attracting customers to rail. On the other, they may have differences of opinion on train capacity and cargo handling equipment. Forwarders would often want more wagon capacity available on trains and more cargo handling equipment in terminals to speed the turnaround of their trucks, but train operators have to make commercial judgments on whether they should invest in assets that might not be fully employed.

CHAPTER 5 SERVICE QUALITY IN PRACTICE

To gain some practical experience and insights into actual levels of service quality, the BTCE monitored the standard of service received by customers shipping containers by rail between Melbourne and Perth on NRC trains. The monitoring covered the two weeks from Monday 27 May to Sunday 8 June inclusive. Given the shortness of the survey period, the results should be taken as indicative only.

The analysis is based on data supplied by four freight-forwarding companies which together consider that they account for almost fifty per cent of the freight consigned by freight forwarders between Melbourne and Perth. They supplied data to the BTCE in confidence and the Bureau has agreed to maintain its confidential status and not release the information to third parties unless expressly and properly authorised to do so by the suppliers. The BTCE further agreed that any results published from the study would show aggregate and average data only.

Four aspects of service were covered by the monitoring: train punctuality, terminal efficiency, cargo care, and short shipping. Of these, the first three were included because they were rated as the three most-important aspects of rail service in the survey of forwarders (chapter 4). Though not rated highly in the survey, short shipping was also included because data on it could be readily collected. On its own initiative, one of the forwarders participating also documented delays caused when level crossing gates were closed across the Docklink Road to Dynon Terminal in Melbourne.

The BTCE also considered monitoring wagon space availability and staff quality, which ranked fourth and fifth as important service characteristics in the survey of forwarders, but decided that this would exceed the limits of time and resources available, both for the BTCE and the forwarders taking part.

PUNCTUALITY OF TRAIN ARRIVALS AND CARGO AVAILABILITY

Train punctuality was monitored by recording the times that trains arrived at their rail terminal destinations and the times that their cargoes were made available for collection by transport operators. Cargoes are not available for some time after a train arrives because the wagons have to be located and made ready for unloading and the cargo checked against the manifest.

Arrival and availability times were recorded by employees of the freight-forwarding companies stationed at Dynon terminal in Melbourne and Kewdale terminal in Perth. Train punctuality was computed by comparing actual and scheduled arrival and availability times.

Current rail industry practice is to publish punctuality indicators based on train arrival times, but customers are more interested in cargo availability times. One of the insights from monitoring was that train punctuality and cargo availability statistics can give different measures of service quality.

Table 5.1 shows the number of trains arriving on time or early, and the number arriving late. Of the fourteen eastbound trains monitored, seven arrived at Dynon on time: of the others five were late by less than 30 minutes and two by over half an hour. In punctuality statistics published by railways, freight trains are counted as on time if they arrive within 30 minutes of schedule. The figures given in table 5.1 are more precise.

The figures for Kewdale in particular show up some of the deficiencies of using indicators based on train punctuality. Of the 16 westbound trains monitored, only two arrived on time at Kewdale and 14 were late, with 12 of these arriving more than half an hour after schedule. This performance was less inconvenient to customers than it looks, however, because some of the late trains arrived during the night, when Kewdale is not open[6] for collection of cargoes. Though the trains were late by rail standards, their cargoes arrived before the time required by consignees.

The opposite can occur if a train arrives on time, then faces delays in making cargo available to customers. Punctuality statistics will show the train arriving on time but cargo availability statistics show a late delivery.

6. Kewdale operates from about 6 am to about 6 pm on weekdays, 6 am to 2 pm at weekends, and by arrangement on public holidays. The hours can be changed to meet commercial needs.

TABLE 5.1 PUNCTUALITY OF TRAIN ARRIVALS

(Number of trains)

Delay in arrivals	*Dynon*	*Kewdale*
Trains on time	7	2
Trains late		
30 minutes or less	5	2
31 to 60 minutes	1	3
Over 60 minutes	1	9
Total number of trains	**14**	**16**

Source BTCE monitoring of Melbourne–Perth NRC rail services, May–June 1996.

TABLE 5.2 PUNCTUALITY OF CARGO AVAILABILITY

(Number of trains)

Delay in availability	*Dynon*	*Kewdale*
Cargo available on time	8	7
Cargo late		
30 minutes or less	4	2
31 to 60 minutes	1	2
Over 60 minutes	1	5
Total number of trains	**14**	**16**

Source BTCE monitoring of Melbourne–Perth NRC rail services, May–June 1996.

A similar problem occurs when late trains arrive close to or after terminal closing time. Punctuality statistics might show a delay of only a few hours but, for practical purposes, the cargoes might not be available until the next day. Collecting cargoes that arrive late in the day can be difficult or impractical because the terminal is not working, or is working with only a skeleton staff, because of the extra costs, or because the consignee's warehouse is not open to receive cargoes.

The lessons drawn from monitoring punctuality can be summarised as follows:

- Monitoring punctuality of train arrival and cargo availability is not technically difficult.

- Cargo availability time is a better measure of customer satisfaction than train arrival time; the monitoring showed the two measures can differ.
- Train punctuality indicators should record the number of trains arriving late and an analysis of the length of the delays. An analysis of delays would give some indication of the cost to customers and also of the variability of rail performance. Variability in itself may be a cost to customers because it makes planning difficult.

TERMINAL EFFICIENCY

From the perspective of freight consignors, the efficiency of rail terminals is largely determined by the turn-around time of trucks delivering or collecting cargoes. The faster they can deliver or collect cargo, the more efficient is the terminal. The turn-around time comprises the time spent inside the terminal plus any time spent queuing outside the terminal gate.

In order to assess terminal efficiency, the BTCE asked its participating transport operators to keep time records for their trucks operating to Dynon and Kewdale terminals. The records covered all truck trips to the terminals, not just those with cargoes being transported between Melbourne and Perth.

For each truck trip, the drivers working for the transport operators recorded details of:

- the time the truck arrived at the queue outside the terminal, the time it arrived at the terminal gate, and the time it left the terminal;
- the number of containers carried — a trailer can carry up to two 6.1 metre containers at a time, so the maximum possible load was two containers to the terminal and two out, or four per round trip; and
- the type of container — numbers were broken down to show the numbers of top-lift and bottom-lift units.

Over the two-week period monitored, the BTCE collected data on over 1500 truck trips (some 1200 to Dynon and 330 to Kewdale) involving a total of 2400 container movements (1870 at Dynon and 530 at Kewdale).

Details of the terminal monitoring are given in appendix IV. The remainder of this section summarises the results and discusses their implications for measuring rail service quality.

Table 5.3 shows the distribution of gate-to-gate times for both the Dynon and Kewdale terminals. Table IV.2 in appendix IV gives the cumulative distribution.

For both Dynon and Kewdale terminals, the analysis of gate-to-gate times shows the following :

- Most trucks transit the yard quickly but a minor percentage face relatively long delays. At Dynon, 31 per cent of trucks recorded a gate-to-gate time of less than 20 minutes but 14 per cent faced delays of one hour or more.
- The times recorded by individual trucks were widely dispersed around the mean. The mean gate-to-gate time at Dynon was 33 minutes with a standard deviation of 24 minutes.
- Gate-to-gate times can vary from day to day during the week and from hour to hour during each day. At Dynon, the average daily gate-to-gate times ranged from 31 minutes early in the week up to 37 minutes on Friday (table IV.3), while times during weekdays ranged from 38 minutes in the afternoon peak to 26 minutes in the evening (table IV.4).

TABLE 5.3 GATE-TO-GATE TIMES FOR TRUCKS VISITING DYNON AND KEWDALE TERMINALS

Time	*Dynon trips*		*Kewdale trips*	
(Minutes)	*Number*	*Per cent*	*Number*	*Per cent*
Less than 10	61	5	33	10
10 to 19	313	26	111	34
20 to 29	266	22	84	25
30 to 39	201	17	58	18
40 to 49	130	11	21	6
50 to 59	69	6	8	2
60 to 69	58	5	10	3
70 to 79	28	2	1	0
80 to 89	24	2	3	1
Over 90	61	5	2	1
Total	**1211**	**100**	**331**	**100**

Source BTCE monitoring of Melbourne–Perth NRC rail services, May–June 1996.

- Average gate-to-gate times vary with the number of containers carried on each trip. For Dynon, the average gate-to-gate time ranged from 26 minutes for trucks carrying only one container to or from the terminal up to 54 minutes for four containers, two into the terminal and two out (table IV.5).
- All else being equal, trucks carrying top lift containers seem to transit the terminals faster than those carrying bottom lift containers (table IV.6). This is a plausible result. Top lift containers can be lifted between rail wagons and trucks in about 60 seconds but a bottom lift unit takes about five minutes. Further, at Dynon, only a limited number of the cargo handling machines can effect bottom lifts, so trucks with this type of container may wait longer for service.

The last two points should be interpreted with care. The results do not prove that gate-to-gate times for individual trucks could be predicted from the number or type of containers that they carry. On the contrary, the wide dispersion of the data suggests that making accurate predictions of gate-to-gate times for individual trucks would be difficult if not impossible on the basis of the data collected. Predicting truck transit times at terminals would require research that goes beyond the scope of this study.

Analysis of times spent by trucks queuing outside terminal gates gave a very similar result (see tables IV.8 to IV.10 in appendix IV). The majority of trucks spent little if any time queuing but a small proportion faced relatively long delays.

At both Dynon and Kewdale, 47 per cent of trucks reported no queuing, while another group of about 30 per cent reported queue times of 5 minutes or less. Only 6 per cent of trucks going to Dynon reported queue times of over 16 minutes while for Kewdale the figure was just under 4 per cent.

Two caveats must be attached to the analysis of queuing times. First, for some trips, drivers neglected to keep a record of whether they had queued outside the terminal gate in addition to the time spent inside the terminal. In these cases, queuing time was assumed to be nil. Second, the queuing figures for Dynon do not include any delays faced by trucks caused by closures of the railway level crossing across Docklink Road.

The lessons derived from monitoring the turn-around times of trucks at terminals can be summarised as follows:

- There are no major problems in monitoring the time spent by trucks inside terminals delivering or collecting containers (the gate-to-gate time) or the time spent queuing outside terminal gates.
- Given the distribution of times, the best performance indicator for terminal service would probably be based on statistics such as the median of the gate-to-gate times or a percentile measure, such as the NRC indicator showing the time taken by trucks in the ninetieth percentile. Table 5.4 shows the mean and median gate-to-gate times for Dynon and Kewdale plus the standard deviation around the mean.
- A single average gate-to-gate time for the whole week does not give a complete picture of a terminal's performance. Further analysis of times is necessary to show terminal performance in both peak and off peak periods.
- Service indicators should provide a measure of the dispersion in gate-to-gate and queuing times. The apparent high levels of dispersion probably make planning difficult for transport operators because they cannot predict how long it will take for individual trucks to deliver or collect cargoes. Even if average truck turn-around times remained unchanged, transport operators would probably be better off with lower variability in terminal transit times.

CARGO CARE

To assess standards of cargo care, the BTCE asked respondents to record details of any containers seriously damaged while in transit by rail between Melbourne and Perth. A seriously damaged container was

TABLE 5.4 MEAN AND MEDIAN GATE-TO-GATE TIMES FOR TRUCKS VISITING DYNON AND KEWDALE TERMINALS

(minutes)

Terminal	*Mean (S.D.)*[a]	*Median*
Dynon	33 (24)	27
Kewdale	24 (17)	20

a. Standard deviation.

Source BTCE monitoring of Melbourne–Perth NRC rail services, May–June 1996.

defined as one that had to be taken out of service for repair of damage suffered on either the outward or inward leg the trip just completed.

As discussed in chapter 4, forwarders identified cargo handling in rail terminals as the time during which the most serious damage was caused to containers and their cargoes. The level of damage to containers while in transit is therefore a proxy for the standard of cargo care in terminals.

The monitoring was limited to seriously damaged containers because neither NRC nor the transport companies seem to keep records of damage to containers on a trip-by-trip basis. Damaged containers are not always repaired immediately. If the damage is only moderate and the unit is still serviceable, damaged containers may make several more trips before being sent for repair.

The standard of cargo care on any rail route therefore cannot be monitored by simply checking each container when it is collected at the destination. Because of the lack of records, there is no way of knowing when or where a container sustained its damage. It might have been on a previous trip, on another route, or even off railway property while being handled by a freight forwarder. A further complication is that containers are sometimes hired between companies or consigned by one company and collected by another.

The BTCE limited monitoring to seriously damaged containers on the assumption that they would not have been consigned in that condition and that the damage must have been sustained on the trip just completed.

For the two weeks monitored, all of the respondent transport companies submitted nil returns. That is, there were no cases of serious damage to their containers shipped between Melbourne and Perth, either eastbound or westbound. Some respondents, however, said it was not typical to go for two weeks without one or two containers sustaining serious damage. There may also have been some containers which suffered less than serious damage during the two weeks and which were kept in service.

The lesson learnt is that monitoring damage to cargo would be difficult, if not impossible, without records showing when and where containers sustain damage. Without such records, it would not be possible to assess the overall level of cargo care although, by mounting special exercises, it might be possible to identify and value cases of serious damage.

SHORT SHIPPING

Short shipped containers are defined as containers accepted for transport but, without prior notice to the forwarder, not loaded on the train on which they were booked or sent to the wrong destination.

There was a low incidence of short shipping over the two weeks:

- respondents at Kewdale reported about a dozen eastbound containers short shipped in each of the two weeks.
- respondents at Dynon reported a total of about 15 westbound boxes short shipped over the two weeks.

To put these figures in context, at the time of monitoring, the NRC was operating 8 trains per week in each direction, each able to carry about 90 6.1 metre containers.

ROAD CLOSURES

All trucks proceeding to or from Dynon terminal travel along the Docklink Road. The road was designed to speed container movements between Dynon rail terminal and the shipping terminals but also carries trucks travelling to and from other areas of Melbourne.

In addition to recording truck times at Dynon, one of the transport companies participating also noted the number of times trucks were delayed by closure of the railway level crossing across the Docklink Road. The crossing is closed for trains travelling into and out of Dynon. The records cover the last seven business days of this survey for closures between about 7 am and 5 pm.

The results are summarised in table 5.5 which shows that there were 278 closures over the period for a total of 728 minutes, or 12 of the 70 hours covered by the survey.

Without further research, the effect of these closures on terminal efficiency at Dynon can be a matter of conjecture only. At off-peak times, short closures probably have little effect, but at peak hours they might lengthen delays. The observer who compiled the figures noted that closures seemed to cause trucks to bank up on the road, and this in turn resulted in queuing at the Dynon terminal gate.

If road closures do indeed exacerbate queuing delays, the problem could worsen in future as increases in Dynon's cargo throughput lead to a greater number of truck trips to the terminal, increased train activity, and more frequent closures of the level crossing.

TABLE 5.5 NUMBER AND LENGTH OF CLOSURES OF DOCKLINK ROAD, DYNON TERMINAL

Date	*Number of closures*	*Total closure time (minutes)*
Thursday, 30 May	49	135
Friday, 31 May	24	51
Monday, 3 June	53	145
Tuesday 4 June	28	83
Wednesday, 5 June	47	121
Thursday, 6 June	33	89
Friday, 7 June	44	104
Total	**278**	**728**

Note The figures in this table cover only the 10 hours between about 7 am to 5 pm each day.

Source BTCE monitoring of Melbourne–Perth NRC rail services, May–June 1996.

APPENDIX I NON-BULK RAIL SERVICES

There are six government-owned rail systems in Australia, all of which carry non-bulk freight.

- The National Rail Corporation (NRC) has three shareholders: the Commonwealth Government and the State governments of Victoria and New South Wales. The NRC was established under Corporations Law to carry interstate freight and began operations in 1993 carrying:
  - intermodal freight (containers)
  - industrial freight such as steel
  - some bulk freight (base-metal concentrates from Broken Hill to Port Pirie in SA)
  - crude petroleum from the Northern Territory to South Australia.

  NRC also operates trailerail (Roadrailer) services between Melbourne and Perth. Two private companies, SCT and TNT, run freight trains between Melbourne and Perth in competition with NRC. The private companies have their trains operated by the three government systems on the route, V-Line, AN, and Westrail, and they also buy 'access rights' to the tracks of these three government systems.
- Queensland Rail operates two non-bulk freight services: (i) Q-Link provides a 'traditional' service of the type common in the pre-container age, accepting small consignments (less than a container load), carrying freight in louvre vans, and operating trains that deliver to several towns en route, (ii) QR Express Freight trains carry only containers and run direct from origin to destination.
- In New South Wales, non-bulk cargoes were, until July 1996, carried by the Rural and Industrial Division of the State Rail Authority (SRA), which ran mixed freight trains carrying containers and break-bulk cargo, plus some bulk cargoes such as cement and petroleum. The

NSW Government then set up Freight Rail as a statutory corporation and its Freight Division took over the operations of the Rural and Industrial Division plus the SRA's grain and mineral services.

- V-Line Freight is a business division of the Public Transport Corporation (PTC) of Victoria. V-Line Freight's task is predominantly intrastate but it also carries small quantities of interstate trade on its lines extending across the northern border of Victoria to towns in southern New South Wales (although, in practice, this has never been counted as interstate trade). V-Line operates a 'Fastrack' service carrying parcels and small consignments plus an intermodal service specialising in containers.
- Australian National (AN) is owned by the Commonwealth Government and operates intrastate services in South Australia and Tasmania plus the rail freight service from Adelaide to Alice Springs in the Northern Territory. AN used to operate freight trains on the trans-Australia line between South Australia and Western Australia but these were transferred to NRC in 1993.
- Westrail, operates a few non-bulk train services in the south-western corner of Western Australia.

THE FREIGHT TASK

The BTCE asked each of the State systems for statistics on their non-bulk freight movements in 1993–94 and 1994–95 (excluding any freight carried for NRC).

Non-bulk freight was defined as cargo in containers, vans or open wagons, including steel, paper, cars, and commodities in tank containers or dry bulk containers. Railways were asked to exclude tonnages for bulk cargoes, which are defined as commodities poured loose into wagons, such as coal, wheat or petroleum.

Data provided by the States are summarised in table I.1 which shows that the intrastate non-bulk freight task totalled over 5 million tonnes in 1993–94 and 1994–95. The Queensland Rail system is by far the biggest operator, followed by the SRA and V-Line. Q-Link and QR Express Freight carrying more than half the total intrastate non-bulk freight in both years. Westrail and AN were at the bottom of the tonnage ranking, together carrying less than half a million tonnes per annum.

The QR figures suggest that Queensland is the only State where rail plays a significant role in carrying consumer goods to the provincial cities. In other States, provincial cities are located close to capital cities and the consumer goods trade seems to be dominated by road transport. The long distances between Brisbane and coastal cities in Queensland, however, may tend to give rail a competitive advantage over road.

In addition to the intrastate trade, NRC carried about 10 million tonnes of interstate cargo (BTCE 1996), most of which was non bulk (except for ore from Broken Hill to South Australia). Together with the 5 million tonnes of intrastate cargo, total non-bulk rail freight therefore averaged about 15 million tonnes in 1993–94 and 1994–95.

The 15 million tonnes of non-bulk freight carried by government rail was less than one tenth of its bulk trade, which averaged 180 million tonnes per annum over 1993–94 and 1994–95 (table I.2). A simple comparison of tonnages, however, belies the importance of non-bulk freight, much of which comprises high-value manufactured goods and processed materials. Compared to values of US$65 and US$192 per tonne for coking coal and wheat, respectively (ABARE 1996a, p. 11, and 1996b, p 28), containerised cargoes are often worth over $A1000 per tonne, about US$750 at exchange rates in mid 1996.

TABLE I.1 INTRASTATE NON-BULK RAIL FREIGHT

('000 tonnes)

System	*1993–94*	*1994–95*
SRA (NSW)[a]	1 052	1 201
V-Line	825	854
Qld: Q-Link	254	315
Qld: QR Express Frt	2 456	2 660
Westrail	251	276
Australian National[b c]	250	267
Total	**5 088**	**5 573**

a. The SRA figures include copper concentrates carried in containers from Cobar to Newcastle for export. The amounts totalled 120 000 tonnes and 201 000 tonnes in 1993–94 and 1994–95, respectively.

b. The AN figures do not include cargoes carried in Tasmania.

c. AN's container cargoes from Mt Gambier totalled 75 000 tonnes in 1993–94 and 69 000 tonnes in 1994–95. This trade terminated in 1995 due to standardisation of the Melbourne–Adelaide line.

Note The figures do not include any non-bulk freight carried by State rail systems on behalf of NRC.

Source BTCE survey of State rail systems and AN, 1995.

TABLE I.2 GOVERNMENT RAIL FREIGHT BY CARGO TYPE, 1993–94 AND 1994–95

(million tonnes)

Cargo type	*1993–94*	*1994–95*
Intrastate bulk cargo	178.1	183.4
Intrastate non-bulk cargo	5.3	5.6
Interstate cargo	10.9	10.0
Total	**194.3**	**198.0**

Note The figures in this table are less than the aggregate tonnages published by each of the systems in their annual reports or elsewhere, which totalled 208 and 205 million tonnes in 1993–94 and 1994–95, respectively. The difference might be caused by double counting of interstate freight hauled by State systems on behalf of NRC.

Sources BTCE survey of State rail systems and AN, 1995; BTCE Transport Indicators database.

Further, if non-bulk rail freight services ceased to operate, the cargoes would switch to trucks on roads, causing increased road pavement damage and congestion, particularly with exports and imports travelling to and from port areas in capital cities and provincial centres.

The importance of capital cities in rail freight statistics is demonstrated by recent experimental estimates from the ABS (1994) showing that they accounted for at least 12 million tonnes of non-bulk rail freight in 1994–95, comprising:

- 6.2 million tonnes of freight railed between the statistical divisions of the capital cities of mainland States (table I.3)
- 3.9 million tonnes of freight railed from country areas to capital cities (table I.4)
- 1.9 million tonnes railed from capital cities to country areas (table I.5).

The ABS figures do not include non-bulk shipments within NSW or WA, as neither State would authorise ABS to release figures at this level of detail.

TABLE I.3 INTERCAPITAL NON-BULK RAIL FREIGHT, 1994–95

('000 tonnes)

	Destination					
Origin	*Sydney*	*Melbourne*	*Brisbane*	*Adelaide*	*Perth*	*Total*
Sydney	–	519	543	182	318	1562
Melbourne	544	–	443	414	323	1724
Brisbane	463	222	–	55	56	796
Adelaide	279	565	108	–	478	1430
Perth	190	214	74	197	–	675
Total	**1476**	**1520**	**1168**	**848**	**1175**	**6187**

Note The figures show movements between capital city statistical divisions.

Source ABS experimental estimates of freight movements, Australia, unpublished.

TABLE I.4 NON-BULK RAIL FREIGHT FROM COUNTRY AREAS TO CAPITAL CITIES, 1994–95

('000 tonnes)

	Destination					
Origin	*Sydney*	*Melbourne*	*Brisbane*	*Adelaide*	*Perth*	*Total*
Country NSW	na	174	579	30	211	994
Country Vic.	34	944	60	262	176	1476
Country Qld	3	1	895	0	0	899
Country SA	67	12	97	289	58	523
Country WA	0	0	2	2	na	4
Total	**104**	**1131**	**1633**	**583**	**445**	**3896**

na Not available.

Note Country areas include all statistical divisions except capital city statistical divisions.

Source ABS experimental estimates of freight movements, Australia, unpublished.

TABLE I.5 NON-BULK RAIL FREIGHT FROM CAPITAL CITIES TO COUNTRY AREAS, 1994–95

('000 tonnes)

	Destination					
Origin	*Country NSW*	*Country Vic.*	*Country Qld*	*Country SA*	*Country WA*	*Total*
Sydney	na	22	0	0	0	22
Melbourne	1	131	0	0	0	132
Brisbane	48	0	1594	0	4	1646
Adelaide	0	43	0	64	0	107
Perth	6	34	0	0	na	40
Total	**55**	**230**	**1594**	**64**	**4**	**1947**

na Not available.

Note Country areas include all statistical divisions except capital city statistical divisions.

Source ABS experimental estimates of freight movements, Australia, unpublished.

INTERSTATE SERVICES

Until 1993, interstate freight services were operated by the State systems and AN. From 1993, NRC began carrying all interstate government rail freight.

Resources

It is somewhat difficult to enumerate the resources used by NRC because it is a new organisation which is still acquiring assets and, in the interim, hiring some resources and services from State systems. In the latter part of 1995, NRC resources included 1200 employees, 5700 wagons, and terminals in each of the five mainland State capital cities and Alice Springs. It also had access to other specialised terminals, such as the BHP steel terminals in Newcastle, Port Kembla, Western Port and Kwinana (NRC 1995a and NRC, pers. comm., 4 July, 1996).

At the date of release of its annual report for 1994–95, the NRC was negotiating to acquire 80 locomotives from State systems and AN, and to hire another 116 (NRC 1995b, p. 24) pending delivery of 120 new 4000 horsepower locomotives being built for it in Australia. NRC has also acquired a substantial number of new wagons, mostly articulated '5-pack' skeletal and double stack container wagons (NRC, pers. comm., 4 July, 1996).

In addition to the traditional type of rail assets, NRC is investing heavily in new computer-based technology to make its operations more efficient and to complement its innovations in management, work practices and operations.

Services

Most NRC services can be classified as: Intermodal trains, SteelLink trains, SeaTrain services, or Trailerail services. In addition, NRC also operates some other services that do not fall into these four categories.

For some services, in particular the SteelLink movements for BHP, the contracts with customers contain incentives or penalties for reliability. These require accurate measurement of train running times (NRC, pers. comm., 10 December 1996).

Intermodal trains are high priority container express trains that operate between terminals in capital cities. (They were previously known as Superfreighter services.) They carry containers only, with all cargo handling in terminals being mechanised. The traditional van-type enclosed wagons are never included in superfreighters and there is no manual handling of cargo in terminals. Intermodal services between Perth and the eastern States operate under the tradename of 'Westlink'.

To speed operations and cut costs, intermodal trains are not broken up at terminals but remain hooked together in 'fixed consist' train lengths while unloading and loading are carried out. This contrasts with the practice in previous years of breaking up trains, then shunting wagons to sidings for cargo handling. Where possible, NRC moves containers directly between rail wagons and the road freight vehicles.

Rail containers comprise a mix of the standard ISO type units used by international shipping (both 6.1 and 12.2 metre) and several non standard types built specially for domestic trade. Non-standard units include some obsolescent equipment plus new containers with a bigger cubic metre payload than similar ISO units. Some domestic units require special machinery for lifting them on and off trains (the so-called 'bottom-lift' units), a requirement that slows down operations, increases handling costs, and may cause safety problems.

TABLE I.6 NRC INTERMODAL SERVICES, AUGUST 1995

(services per week)

	Destination					
Origin	*Brisbane*	*Sydney*	*Melbourne*	*Adelaide*	*Perth*	*Total*
Brisbane	–	7	10	2	1	20
Sydney	7	–	7	6	5	25
Melbourne	10	7	–	7	7	31
Adelaide	2	6	7	–	9	24
Perth	1	5	7	0	–	13
Total	**20**	**25**	**31**	**15**	**22**	**113**

Note In addition to these services, NRC operated 6 services a week in each direction between Alice Springs and Adelaide.

Source NRC, 1995c.

Virtually all intermodal freight comes from freight forwarders. Individual customers can consign cargo direct with NRC but they have to make their own arrangements for hiring containers and local carriers to pick up and deliver the cargo.

Table I.6 shows the origins and destinations of the 113 intermodal services per week operated by NRC in August 1995 between mainland capital cities. In addition, NRC operated six services per week each way between Adelaide and Alice Springs which might be called 'mixed freight' trains because they also carried livestock and petroleum wagons.

Few, if any, ancillary services are available from NRC for its intermodal customers: it does not rent containers, provide pick-up or delivery services, or shunt wagons to private sidings. On the Melbourne to Perth route, however, electricity is provided on some trains to operate refrigerated containers.

SteelLink. NRC's SteelLink services carry industrial products, such as steel and paper, direct from customers' sidings. The SteelLink service was originally developed for BHP, then extended to other customers who regularly ship large quantities of homogeneous cargo, in full or part train loads. (In shipping, similar full ship-load consignments of one commodity, such as steel or timber, are described as 'semi-bulk' or 'quasi-bulk'). The figures in table I.7 show that NRC was operating 44 SteelLink services per week in 1994–95.

TABLE I.7 NRC STEELLINK SERVICES, AUGUST 1995

(services per week)

Origin	Destination								Total
	Brisb.	N'castle	Syd.	PKembla	Melb.[a]	Adel.	Why.	Perth[b]	
Brisbane	–	1	1	1			1	1	5
N'castle	1	–	1	1	1	1	1	1	7
Sydney		1	–	1	1		1		4
P Kembla	1	1	1	–	2	1	1	1	8
Melb.		1	1	1	–		1		4
W Port				1		–	1		2
Adelaide		1		1			–		2
Whyalla	1	1	1	1	2	1		1	8
Perth	1								1
Kwinana		1		1			1		3
Total	**4**	**7**	**5**	**8**	**6**	**3**	**7**	**4**	**44**

a. Melbourne figures include two trains to Western Port from Pt Kembla and Whyalla.

b. Perth figures include three trains to Kwinana from Newcastle, Pt Kembla and Whyalla.

Note In addition to the services shown in the table there is one service a day between Broken Hill and Port Pirie.

Source NRC, 1995c.

SeaTrain SeaTrain Services carry shipping containers between Port Botany and Brisbane and between Melbourne and Port Adelaide (Outer Harbour). The cargoes comprise mostly standard ISO units consigned by international shipping lines and possibly some domestic Tasmanian cargoes. For transhipment on other routes, containers are sent on intermodal services.

Shipping lines use the SeaTrain service to centralise containers at one port, thereby saving on ship's time and costs by reducing port calls. For example, instead of calling at both Sydney and Brisbane, a line might rail its Brisbane exports south for loading at Sydney. Some lines centralise cargo for all their sailings and others do it only as an emergency measure, so that a ship can make up lost time by missing a port call.

In addition to moving import and export cargoes, rail plays an important role in re-locating empty containers, carrying boxes from ports that have a net surplus of empties to regions that have a deficit.

SeaTrain services are slower than Intermodal trains, taking longer to deliver containers between cities. This is not usually a problem because shipping lines plan cargo transhipments well in advance, the aim being to have containers arrive at the shipping terminal just before the ship arrives. In any case, urgent consignments can be sent on Intermodal services.

Trailerail services are based on specially strengthened road trailers that can be converted to rail wagons by the addition of a rail bogie. For pick up and delivery, the Trailerail trailer is essentially an ordinary road trailer, running on rubber wheels and hauled by a prime mover. For the line haul, it becomes a rail wagon, hauled by a locomotive and running on steel wheels.

The commercial benefits claimed for Trailerail include: a smooth ride (reducing damage to cargo); increased profits for truck owners by better use of prime movers; and speed at terminals because a complete train can be assembled in a fraction of the time needed to load a container train and, at the destination, the first trailers can leave the terminal minutes after the train arrives (NRC c.1995).

In 1995, NRC operated 20 SeaTrain services per week but only four Trailerail trains (table I.8). The number of Trailerail services is constrained by the available rolling stock but is currently considered by NRC to be at the right level in terms of the business volume so far achieved (NRC, pers. comm., 10 December 1996).

TABLE I.8 SEATRAIN AND TRAILERAIL SERVICES, AUGUST 1995

Service type and route	*Number of services per week*
SeaTrain Services	
Port Botany to Brisbane	5
Brisbane to Port Botany	5
Melbourne to Port Adelaide	5
Port Adelaide to Melbourne	5
Trailerail Services	
Melbourne to Perth	2
Perth to Melbourne	2
Total	**24**

Source NRC, 1995c.

INTRASTATE SERVICES

The task of State rail systems in the non-bulk sector is to distribute consumer goods and industrial inputs to regions and to move export cargoes to ports. Rail also moves empty containers from ports to regions for loading with exports.

Resources

Table I.9 summarises the resources used by State rail systems in their non-bulk services in the latter part of 1995. The figures are estimates made by the systems for this report and, to the extent that non-bulk services share resources with bulk and passenger operations, would be underestimates.

In total, the resources comprise:

- over 96 locomotives (QR Express Freight shares resources with other areas and could not enumerate its loco fleet);

TABLE I.9 RESOURCES EMPLOYED ON INTRASTATE NON-BULK RAIL FREIGHT OPERATIONS

(number)

Resource type	*QR Q-Link*	*QR Exp. Freight*	*SRA*	*V-Line*	*Westrail*	*AN*	*Total*
Locomotives	15	s	28	40	6	7[a]	96+
Wagons: flat	100	1505	667	442	80	100	2854
Wagons: box	450	913	103	53	16	0	1607
Wagons: other	0	998	0	60	22	0	1185
Containers	0	170	0	0[b]	0	0	170
Employees	520	87	s	400	22	25[a]	1054+
Container terminals	na	10	16[c]	14	2	0	42

na Not applicable

s Shared resources; separate non–bulk figure not available

a. The locomotive and employee figures for AN show the estimated assets needed on a stand-alone basis for this trade.

b. V-Line Trackfast uses curtain-sided containers that stay on wagons permanently.

c. Some terminals in NSW are privately operated.

Source BTCE survey of State rail systems and AN, 1995.

- 170 containers — the State rail systems do not rent containers to customers but Queensland Rail has a small inventory of 170 which it uses for moving large break-bulk consignments; V-Line also uses curtain sided containers but they stay permanently on wagons;
- over 5600 wagons of various types;
- 42 container terminals plus 24 centres in Victoria for non-containerised freight and 48 in Queensland — AN does not operate any terminals for non-bulk trade, with all its cargoes going through private terminals; and
- at least 1050 employees directly employed; SRA employees are shared with other areas and hence it could not estimate a number, while QR Express Freight, Westrail and AN have identified only the people in terminals.

Train services

Table I.10 gives a summary of the QR Express Freight trains operated in Queensland and the non-bulk rail services in other States as at 1995.

TABLE I.10 INTRASTATE NON-BULK FREIGHT SERVICES

(services per week)

Queensland	*NSW*	*Victoria*[a]	*SA*	*WA*
Ex Brisbane to:–	*Ex Sydney to:–*	*Ex Melbourne to*	Port Pirie to	Forrestfield to
Rockhampton –14	Grafton–5	Ballarat–5	Adelaide–5	W Kalgoorlie–7
Mackay–1	Dubbo–5	Bandiana–5		
Townsville–32	Parkes–5	Donald–5	Whyalla to	Manjimup to
Cairns–6	Tamworth–5	Horsham–5	Adelaide–7[b]	Nth Wharf –2
Toowoomba–22	(Narrabri–3)	Colac–5		
Townsville to	Griffith–5	Merbein–5	Adelaide to	
Cairns–12	Blayney–5	Mooroopna–5	Transline–1	
Mt Isa–7		Portland–5		
		Sale–5		
Rockhampton to:		Echuca–5		
Emerald–5		Warrnambool–5		
		Deniliquin–5		
		Tocumwal–5		

a. Superfreighter container services only; additional trains are provide for Fastrack services.

b. AN pays NRC a fee for hauling the Whyalla to Adelaide service.

Source BTCE survey of State rail systems and AN, 1995.

Queensland Rail Express Freight trains carried only containers and ran direct from origin to destination. The table shows only the forward leg of each service (the direction in which most cargo is consigned). On some routes, services also operated on the backleg.

Queensland Rail's second non-bulk service, Q-Link, provides door-to-door transport for LCL consignments. It uses a rail freight plus an extensive network of road services. On long-distance routes, rail is used for the line haul and then Q-Link arranges delivery to the consignee using its own trucks or local contractors. For destinations close to Brisbane, road may also be used for the line haul.

Q-Link operates a 'traditional' service of the type typical in the pre-container age. Q-Link loads its cargo in louvre vans and curtain units, and its trains leave individual wagons at freight centres for unloading, then move on to the next town. The Q-Link network comprises 48 'Freight Distribution Centres' running from Brisbane to Cairns, thence inland to Atherton. Trains also run from Townsville to Mt Isa and from Rockhampton to Longreach.

SRA In New South Wales, non-bulk rail freight is handled by the Freight Division of Freight Rail. With one exception, Freight Rail does not operate specialised trains for non-bulk freight. Rather, it runs what are essentially mixed freight trains carrying all types of cargoes. For example, the one train might include flat wagons carrying containers, vans with parcel freight, and bulk petroleum and cement in specialised wagons. Parcels and LCL cargoes are carried under the trade name of Trackfast, and are loaded into louvre vans by rail staff or sent direct by road.

The Freight Division operates 25 radial services per week to country centres. Additional trains operate on request for seasonal or irregular consignments of specific commodities.

The Freight Division also operates one dedicated container train between the country town of Blayney and Sydney. This is the only service in NSW that resembles the intermodal services operated by the NRC and V-Line. The Blayney terminal is operated by a freight-forwarding company which also provides a pick-up and delivery service. Much of the cargo comprises exports.

V-Line In Victoria, V-Line operates two non-bulk services. The 'Fastrack' operation is a door-to-door service for parcels and small consignments (LCLs) with private sector road contractors hired to make deliveries in country areas. It operates between six 'freight gate' centres in

TABLE I.11 INTRASTATE NON BULK RAIL FREIGHT BY TYPE OF CARGO UNIT

(per cent of cargo)

Cargo unit	*QR Q-Link*	*QR Exp. Freight*	*SRA*	*V-Line*	*Westrail*	*AN*
Containers	15	63	85	90	93	78
Box wagons	50	22	5	5	7	0
Open wagons	5	15	10	5	0	0
Other	30 [a]	0	0	0	0	22 [b]
Total	**100**	**100**	**100**	**100**	**100**	**100**

a. Includes 25 per cent of cargo carried by road plus 5 per cent in refrigerated wagons.

b. Flat wagons.

Source BTCE survey of State rail systems and AN, 1995.

Two of the systems reported moving freight in 'other' types of cargo units. The 30 per cent of Q-Link's freight consigned in 'other' cargo units comprised 5 per cent carried in refrigerated wagons and 25 per cent sent direct by road. AN moved 22 per cent of its cargo on flat wagons which are mostly for steel traffic plus some for heavy machinery.

Customers

Table I.12 gives a break-down of the type of customers shipping non-bulk freight on intrastate services. Shipping lines consign rail freight in cases where they become responsible for export cargoes at the point of origin. For example, they assume responsibility for some export cargoes of meat in country Queensland, then rail them to Brisbane for export or transhipment to a southern port. Consignments from shipping lines may also include imports being railed to their destinations from the port of landing, plus some domestic cargo from the Tasmanian trade.

Some exports are also consigned to ports by producers or through freight forwarders. This seems to be the case in New South Wales and Victoria, both of which carry exports but which reported no consignments from shipping lines.

The percentage of cargo shipped by freight forwarders ranges from zero on AN to 51 per cent with the SRA. The QR figures suggest that Queensland is the only State where rail plays a significant role in distributing consumer goods to provincial cities. Thus, 26 per cent of the containerised cargo on QR Express Freight is consigned by forwarders and 55 per cent of the freight moved by Q-Link comes from retailers, wholesalers and distributors.

The cargoes consigned by shipping lines on Westrail services probably comprise imports being sent to regional centres. As far as Westrail staff are aware, their non-bulk services do not regularly carry export cargoes. (Although Westrail's bulk trains carry significant quantities of export cargoes.)

TABLE I.12 INTRASTATE NON BULK RAIL FREIGHT BY CONSIGNOR TYPE

(per cent of cargo)

Cargo unit	*QR Q-Link*	*QR Exp. Freight*	*SRA*	*V-Line*	*Westrail*	*AN*
Shipping lines	0	22	0	0	9	78
Freight forwarders	2	26	51	0	12	0
Manufacturers	13	10	0	15	29	20
Mining industry	10	11	0	0	39	1
Grazing & farming	20	20	46	85[a]	0	0
Other	55	11	3	0	11	1
Total	**100**	**100**	**100**	**100**	**100**	**100**

Note Differences are due to rounding.

a. Some of the rural produce carried by V-Line freight has undergone some processing.

Source BTCE survey of State rail systems and AN, 1995.

APPENDIX II CURRENT REPORTING OF SERVICE QUALITY STANDARDS

Published data on the current state of rail service quality is available from two main sources: the annual reports and corporate plans of railways; and the reports of bodies that monitor industry performance, viz. the former BIE and the Steering Committee on National Performance Monitoring of Government Trading Enterprises.

ANNUAL REPORTS

State Rail Authority of NSW (SRA) Train punctuality is the only service indicator published in the SRA's 1995 annual report. In 1994–95, 90 per cent of SRA freight trains ran on time, a 5 percentage point improvement over the 85 per cent figure for the previous year (SRA 1995, p. 17).

Without giving results, the SRA's 1995 report also states that a survey of 14 major customers had been carried out to determine levels of customer satisfaction and to identify performance gaps. The SRA carried out a further survey of its Freight Rail staff to obtain an internal perspective on service issues.

V-Line The PTC's annual report for 1995 noted that 86 per cent of freight trains ran on time in 1994–95, this being defined as arriving within 30 minutes of scheduled time (PTC 1995, p. 20). It was also noted that upgrading work at V-Line's Dynon terminal (a separate facility from NRC's Dynon terminal) allowed trucks delivering containers to be turned around within 15 minutes (PTC 1995, p. 14).

QR Queensland Rail carries out regular surveys to measure levels of customer satisfaction in selected areas of operations. From a maximum possible figure of 5.0, QR's annual report for 1994–95 reported a customer satisfaction score of 3.8 for its Express Freight service and 3.7 for Q-Link (QR 1995, p. 2).

Rolling stock availability statistics have also been given in past reports for QR's Coal and Minerals Group. In 1993–94, QR reported that it had met or surpassed its rolling stock availability targets of 94 per cent for electric locomotives, 85 per cent for diesel locomotives, and 95 per cent for coal and mineral wagons (QR 1994, p.25). Its 1994–95 annual report, however, gives only target figures for 1999–2000: 96 per cent for electric locomotives, 90 per cent for diesels, and 96 per cent for wagons (QR 1995, p.23). Comparable figures are not given for rolling stock used in carrying non-bulk freight.

Westrail For its cargoes of woodchips and grain (that is, bulk freight), Westrail publishes a 'delivery performance indicator' which shows tonnes delivered as a percentage of tonnes ordered. This indicator has replaced the freight satisfaction index and is considered to be one of Westrail's prime performance indicators. For 1995, the delivery performance indicator was almost 100 per cent for woodchips and just over 90 per cent for grain (Westrail 1995, p. 52).

Westrail also publishes charts showing train punctuality data for its bulk operations and other services. In 1995, an intrastate non-bulk train was counted as being on time if it arrived within 15 minutes of its scheduled time. In previous years, arrival with 30 minutes was counted as being on time.

NRC The NRC 1994–95 Annual Report lists four service quality indicators (NRC 1995b, p. 4) while its Statement of Corporate Intent gives its service targets (NRC 1995e, p. 5):

- train punctuality, or on-time arrival, measured as the percentage of trains arriving within 30 minutes of schedule. Figures are shown for each quarter, the performance for the April to June quarter of 1995 being 67 per cent for intermodal trains and 70 per cent for direct customers. (The Statement of Corporate Intent does not give a target for punctuality.)
- turn-around times for customers' trucks at rail terminals measured as the gate-to-gate times for the 90th percentile; the figure was 39 minutes for the April to June quarter of 1995, better than the target average of 45 minutes.
- lifting equipment availability, which was 94 per cent for the June quarter compared with the target of 96 per cent.
- wagon availability, which was 91 per cent for the June quarter compared with the target of 95 per cent.

NRC's current service quality indicators and targets differ from those published in its original Statement of Corporate Intent in 1993 (NRC 1993, p. 36):

- 99 per cent on-time consignment availability
- 30 minute maximum road vehicle terminal turn-around time
- loss and damage claims less than 1 per cent of revenue
- satisfied customers.

Australian National does not publish data on service quality in its annual report (ANRC 1995) but has supplied data on train punctuality and cargo damage to the Steering Committee and the BIE for publication in their respective reports.

OTHER SOURCES

The BIE has monitored rail industry performance as part of its work making international benchmark comparisons for selected Australian industries (BIE 1992, 1993, 1995a, 1995b). For the rail industry, it collected data on two indicators of service standards: train punctuality and cargo care. The cargo care indicator is calculated as the ratio of claims paid by railways for cargo lost or damaged to total freight revenue.

The BIE also published data comparing transit times for trains, trucks and ships on selected routes, but these are not 'pure' indicators of service quality as they reflect the state of infrastructure used by each mode and other factors.

The Steering Committee (1995, pp. 277–320) also publishes data on freight train punctuality plus a number of other performance indicators.

APPENDIX III SURVEY OF RAIL FREIGHT FORWARDERS

Freight forwarders provide a package of services that together constitute door-to-door transport. For consignors sending full container loads (FCLs), forwarders provide containers, book space on trains, and arrange trucks to carry cargoes from the customer's premises to the rail terminal, and from the destination terminal to the consignee. Some forwarders carry commodities requiring special equipment, such as chemicals or refrigerated food.

For less than full container loads (LCLs), forwarders provide similar services plus consolidation of loads. They take LCL cargoes to their depot and consolidate them into container loads which are then delivered to the rail terminal. At the destination, they take the containers to their depot for unpacking before individual shipments are sent to consignees by delivery vans.

Assets used by forwarders include trucks, containers, cargo handling equipment (such as fork-lift trucks), and depots for handling LCL cargoes and for storing of containers. Some of these assets are owned by forwarders but they also hire extra equipment to meet peaks in demand.

Firms shipping FCLs do not have to send cargo via forwarders. Indeed, some large companies make their own transport arrangements. The attraction of forwarders is that they offer a single point of contact for arranging door-to-door transport and the convenience (and cost savings) of one invoice rather than separate bills for pick up, delivery, container hire and rail transport.

Forwarders also have several other attractions for freight consignors:

- because they have a network of branches, forwarders are generally better than consignors at monitoring train movements and dealing with problems such as delays or damaged containers.

- some forwarders provide a total logistics service covering all transport, warehousing and distribution activities from the factory to the retailer.
- forwarders can often attain lower costs than consignors acting on their own, due to their management skill and their greater opportunities to use equipment more intensively.

If forwarders are unsatisfied with rail, they can switch easily to road, either directly for cargoes where forwarders make the mode choice, or indirectly via advice to customers. Most of the forwarders interviewed could quickly switch from rail because they already ship a large proportion of their freight by road, and some use rail on only a few routes. Only a few forwarders send all of their interstate freight by rail.

The import of this goes beyond the immediate loss of freight revenue. When rail loses forwarders as customers, it also loses a source of investment in the assets and infrastructure needed to sustain its operations, such as trucks, depots and containers. Some of these assets could be hired from other sources but forwarders are the main providers of terminals for consolidating LCL consignments and of containers specially built for the domestic trade.[7]

THE SURVEY

This appendix presents the results of the BTCE survey to identify the key aspects of rail service from the viewpoint of the customer. The survey was carried out during interviews between the BTCE and managers from rail freight forwarders in the latter part of 1995.

The ten firms which took part in the BTCE survey are listed in box 3.3 in chapter 3. At the time the survey was carried out, one of the respondents, Railor, had just purchased Interlink Distribution Services, a subsidiary of Mayne Nickless Ltd, so the survey effectively covered eleven companies.

All the survey respondents consign non-bulk freight by rail on interstate routes and, taken together, would almost certainly account for the

7. Rail can also carry freight in international shipping containers but the units specially built for domestic trade are often more efficient, having bigger weight and volume capacities and the ability to carry cargo efficiently on Australian standard pallets.

majority of freight shipped via forwarders on NRC's intermodal services. Some of the forwarders participating in the survey also consign non-bulk cargoes on intrastate rail services.

Respondents took part in the survey on the understanding that their answers would be treated as commercially confidential and that the published results of the survey would present only aggregated figures.

RESPONDENT DETAILS

The questionnaire used in the survey had two parts. In part 1, respondents were asked to give details about their company and its activities. In part 2 they were asked to rank service characteristics in order of importance.

The questions in part 1 were intended to provide a picture of the activities of the rail forwarding industry and to determine, if possible, if there were sub-sectors in the industry with differing service requirements. Given that the population of the industry is small and that there is some degree of specialisation (described later), it is not possible to publish much detail about sub-sectors without the risk of breaching confidentiality.

Depot locations

Table III.1 summarises the results from questions 1 and 2 in the survey which asked forwarders to identify the capital cities where they had one or more rail terminals or depots, and the States where they operated terminals in country areas. The table shows that eight of the forwarders had one or more terminals in Sydney and that three operated terminals in country New South Wales.

The overall picture given by table III.1 is that rail freight forwarders have concentrated their activities on interstate shipments between capital cities and have only a small involvement in intrastate operations. Respondents reported that they operated 14 terminals but, in country areas, about half of these are specialised for handling specific commodities or customers rather than general trade.

This does not mean, however, that major forwarders are not involved in freight operations in country areas; rather that they do not use rail. According to respondents questioned on this matter, much of the

TABLE III.1 LOCATION OF SURVEY RESPONDENTS' RAIL DEPOTS

(number of respondent forwarders)

State	*Capital city*	*Country areas*
New South Wales	8	3
Victoria	10	2
Queensland	8	5
South Australia	7	1
Western Australia	10	3
Northern Territory	0	2
Total	**45**	**14**

Source BTCE survey of rail freight forwarders, 1995.

domestic freight going to country areas is sent by road transport, often under a cooperative arrangement with a regional transport operator. The only State where national freight forwarders make significant use of rail for intrastate operations is Queensland.

It might also be that very little of the freight transported to or from country areas is attractive to rail forwarders. A large proportion of cargoes from capital cities to the country would comprise consumer goods, for which shippers prefer trucks. Much of the trade to the coast, on the other hand, would comprise containerised export cargoes for which railways deal direct with shipping lines or producer bodies.

Consignment size

The figures in Table III.2 are based on question 4 in the survey, which asked respondents to give a break-down of the tonnage of each type of cargo they carried. FCL consignments comprised the majority of the trade carried by four respondents (although they also carried other types of freight) and two others reported that LCL consignments accounted for well over half of their tonnage, with FCLs making up the rest. The remaining four respondents comprised two specialising in the transport of liquid and dry bulk cargoes in containers, one car carrier and one firm specialising in break bulk cargoes.

TABLE III.2 MAJOR FREIGHT TYPES CARRIED BY RESPONDENTS

(number of forwarders)

Type of freight	
Full container loads (FCLs)	4
Less than full container loads (LCLs)	2
Refrigerated	0
Bulk in container	2
Other	2
Total	**10**

Source BTCE survey of rail freight forwarders, 1995.

In question 3 of the survey, respondents were asked to estimate the percentage of their rail freight that could be classified as:

- highly time sensitive — shipments that have to arrive on a specific day;
- moderately time sensitive — shipments for which arrival within one or two days of the scheduled time is acceptable; and
- not time sensitive, such as shipments to long-term warehouse storage.

Table III.3 shows that eight of the respondents reported that most of their freight comprised highly time sensitive shipments, the actual proportions ranging from 50 to 100 per cent of their tonnage. Of this group, most also reported that moderately time sensitive cargoes comprised about 30 per cent of their cargoes. Over half of the respondents said that some of their cargoes were not time sensitive but the proportions were not high, never exceeding 20 per cent for any individual forwarder.

Table III.3 should not be interpreted as meaning that forwarders expect high-speed delivery from rail. On the contrary, customers use air or road if they want the fastest available transport or early morning delivery. Rather, the respondent forwarders are saying that, for over half of the tonnage they carry, it is important for their customers that consignments arrive at the scheduled time.

TABLE III.3 TIME SENSITIVITY OF MOST FREIGHT CARRIED BY RESPONDENTS

(number of forwarders)

Time sensitivity	
Highly time critical	8
Moderately time sensitive	2
Not time sensitive	0
Total	**10**

Source BTCE survey of rail freight forwarders, 1995.

Mode choice

Question 5 asked respondents to estimate the percentage of the tonnages they had shipped by each transport mode over the last financial year (excluding any Tasmanian shipments or air freight). Five of the ten respondents reported that 50 per cent or more of their freight had been shipped by road and the other half said that the majority of their cargoes had been sent by rail.

Over half of the respondents had sent some cargoes by sea but its share was low, never exceeding 20 per cent of freight from any individual forwarder. All domestic sea freight consignments were between eastern States and Fremantle. Bass Strait trade was not covered in the survey. Some of the respondents who did not use sea transport were investigating its suitability for their business.

From discussions with forwarders, the BTCE's impression is that they view sea shipment as an attractive alternative to rail for cargoes where speed or frequency are not of critical importance. Sea prices can be lower and, for some commodities, the quality of cargo handling is better with lower levels of damage.

RESULTS

In the second part of the questionnaire, respondents were first asked to rank the service characteristics listed in box 3.1 in order of their importance to customers, then to assess their relative importance by allocating 100 points between the five highest-ranked characteristics and 'all other' service characteristics.

The results are summarised in table III.4, where the second column shows the ranking of service characteristics as determined by the allocation of points, the third column shows the aggregate point score for each characteristic, and the fourth column shows the number of times each characteristic was included in the top five by respondents. The names of service characteristics are listed in abbreviated form in the first column.

The top four service characteristics were, in order:

- punctuality, arrival of train on scheduled time
- care of cargo as measured by damage to equipment
- terminal efficiency, as measured by truck turn-around times
- wagons available when needed.

TABLE III.4 RESULTS OF SURVEY OF RAIL SERVICE CHARACTERISTICS

Service characteristic	*Rank*	*Aggregate point score*	*Times mentioned in top 5*
1. Staff quality	5	80	4
2. Access to information	8	50	4
3. Answering phones		0	0
4. Quality accreditation		0	0
5. **Punctuality**	**1**	**185**	**8**
6. Service delivery	11	10	1
7. **Wagon availability**	**4**	**100**	**4**
8. **Damage to equipment**	**2**	**110**	**6**
9. Departure time	11	10	1
10. Arrival time	6	70	4
11. Speed	7	65	5
12. Frequency	6	70	3
13. Invoicing accuracy	9	35	2
14. Booking procedures	0	0	0
15. **Terminal efficiency**	**3**	**105**	**7**
16. Operating hours		0	0
17. Solving problems	10	15	2
All the rest		95	5

Source BTCE survey of rail freight forwarders, 1995.

The results show that, for respondents to this survey, train punctuality is clearly the most important characteristic of rail service quality. It was listed as one of the top five service characteristics by eight of the ten respondents, who gave it a total score of 185 points compared with 110 for the second ranked characteristic.

The next three characteristics in the ranking were obviously considered as important by shippers but there was very little difference between their rankings, with care of equipment receiving 110 points, terminal efficiency 105 points, and wagon availability 100 points. This suggests that the respondents see them as being of approximately equal importance.

Taken together, the four characteristics ranked highest accounted for half of the points allocated by all respondents, 500 out of 1000. The other characteristics listed on the survey questionnaire accounted for 405 points and 95 points were allocated to a residual category called 'all the rest'; that is, characteristics not listed in the survey.

APPENDIX IV TERMINAL EFFICIENCY

This appendix presents an analysis of truck turn-around times at the Dynon rail terminal in Melbourne and the Kewdale rail terminal in Perth over the two weeks 27 May to 9 June 1996 inclusive. For Kewdale, the companies carrying out the monitoring collected data for weekdays only.

THE DATA

For each truck trip to a terminal, the transport companies participating supplied information about:

- the date of the trip,
- the time the truck arrived on the queue to the terminal gate, the time it arrived at the terminal gate, and the time when it left the terminal,
- the number of containers carried into the terminal and the number carried out of the terminal,
- container type; the container numbers were disaggregated to show the number of 'top-lift' and 'bottom-lift' units,
- a 'yes-no' field showing whether the trailer was part of the trailer pool operated at each terminal.

Data were collected for all truck trips to the terminals for the respondent companies, not just those carrying cargoes for shipment between Melbourne and Perth, and included trips by their employees and by sub-contractors.

To collect the information, the BTCE distributed data collection forms to the respondent companies. Details of truck trips were recorded by each driver or transcribed to the data sheets from other records by company staff.

There were two areas where the quality of the data was uncertain. First, many drivers neglected to identify cargoes moving on pool trailers and hence this part of the data was not analysed here. Second, some records show only two of the three times drivers were requested to record, namely when they arrived at the gate and left from the terminal, but not when they arrived on the queue. For these cases, the BTCE assumed that drivers recorded queueing times only when there was a queue.

In checking the data, the BTCE discovered that some trucks carried no cargo to or from the terminal. Since the introduction of the trailer pool[8] at Dynon and Kewdale, some prime movers travel to the terminal to collect an empty trailer, thence to the consignor's premises for loading. For such round trips, no containers are carried, either to or from the terminal. (There are also trips to drop off empty trailers in the pool at the terminal.) It was not always possible to tell the difference between incomplete records and records for trips without containers to pick up or drop a pool trailer, so both were deleted.

Table IV.1 shows results after editing was completed to delete incomplete records. Data were collected on 1211 truck trips to Dynon terminal in Melbourne involving, 1877 containers, and 331 truck trips to Kewdale, involving 530 containers. The table also gives a break down showing the number of top lift and bottom lift units and the numbers carried into and out of the terminals.

GATE-TO-GATE TIMES

The gate-to-gate time is the time spent by a truck *inside* the rail terminal, measured from the time the truck arrives at the entrance gate to the terminal until it passes the gate again on the way out. Gate-to-gate time does not include any time queueing outside the terminal gate. (Queueing times are discussed the next section.)

Table 5.3 (chapter 5) gives an analysis of gate-to-gate times at Dynon and Kewdale terminals. Table IV.2 gives a cumulative analysis of the same data.

8. This is a pool of empty trailers left at the terminal. For incoming cargoes, containers are transferred from wagons to pool trailers which are then collected by prime movers and taken to the consignee. Because the trailer is loaded in advance, trucks can attain faster turn-around times.

TABLE IV.1 TRUCK TRIPS AND CONTAINER MOVEMENTS FOR DYNON AND KEWDALE RAIL TERMINALS

(number)

	Dynon	*Kewdale*
Truck trips	1211	331
Containers		
Top-lift in	789	126
Bottom-lift in	327	128
Top-lift out	573	135
Bottom-lift out	188	141
Total containers	1877	530

Note The figures in this table were provided by four freight forwarders operating in the Melbourne–Perth trade. They show the number of trucks trips to Dynon and Kewdale rail terminals by the respondent companies over the two weeks 27 May to 9 June and the number of containers carried by the trucks into and out of the terminals.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

TABLE IV.2 CUMULATIVE DISTRIBUTION OF GATE-TO-GATE TRUCK TIMES AT DYNON AND KEWDALE TERMINALS

Time (Minutes)	*Dynon (Per cent)*	*Kewdale (Per cent)*
Less than 10	5	10
10 to 19	31	44
20 to 29	53	69
30 to 39	69	86
40 to 49	80	93
50 to 59	86	95
60 to 69	91	98
70 to 79	93	98
80 to 89	95	99
Over 90	100	100

Note The gate-to-gate time is the time spent by a truck in the terminal, measured from the time it arrives at the gate to the time it exits the yard.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

Gate-to-gate times by day and hour

Tables IV.3 and IV.4 show how gate-to-gate times varied from day to day and during the day.

The point to note from these tables is that a single average gate-to-gate time for the whole week does not give a comprehensive picture of a terminal's performance. For example, at Dynon, the gate-to-gate time over a full week averaged 33 minutes, but daily averages ranged from 31 minutes to 37 minutes (table IV.3), and averages at different hours of weekdays ranged from 25 to 38 minutes (table IV.4). At Kewdale, daily averages ranged from 17 to 29 minutes with an overall average for the week of 24 minutes, and averages at different hours of the day ranged from 17 to 29 minutes.

According to forwarders, peak periods are determined by customer preferences for making deliveries during business hours, and NRC working practices. For example, the peak at Kewdale on Monday and Tuesday reflects the activity of trucks coming to the terminal to collect freight from trains that crossed the Nullarbor over the preceding weekend.

TABLE IV.3 AVERAGE GATE-TO-GATE TIMES FOR TRUCKS VISITING DYNON AND KEWDALE TERMINALS, BY DAY OF WEEK

(minutes)

Day	*Dynon*	*Kewdale*
Monday	31	29
Tuesday	31	27
Wednesday	36	17
Thursday	33	19
Friday	37	24
Saturday	31	0
Sunday	0	0
All days	33	24

Note The figures in this table show the averages for the two-week period covered by the survey. For example, the average Monday gate-to-gate time of 31 minutes at Dynon is based on data for Monday 27 May and 3 June. The Monday figure for Kewdale is based on one day as that terminal was closed for the Foundation Day public holiday on 3 June.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

TABLE IV.4 AVERAGE GATE-TO-GATE TIMES FOR TRUCKS VISITING DYNON AND KEWDALE ON WEEKDAYS, BY TIME OF DAY

(minutes)

Time	*Dynon*	*Kewdale*
Before 06.00	28	20
06.00 to 07.59	36	22
08.00 to 11.59	37	25
12.00 to 13.59	38	24
14.00 to 15.59	32	29
16.00 to 18.00	25	17
After 18.00	26	0[a]

a. Monitoring of Kewdale covered the hours of 6am to 6pm weekdays only.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

Gate-to-gate times by number of containers

Table IV.5 classifies gate-to-gate times by the number of containers carried to and from the terminal on each trip. Semitrailers can carry a maximum of four 6.1 metre containers per trip, two into the terminal and two out of it. The survey also recorded some B-doubles carrying three containers, giving a maximum of six containers per round trip. The number of trips with more than four containers was small and they are not shown in table IV.5.

For this study, each 12.2 metre (40 foot) container was counted as one unit rather than as two 20 foot equivalent units, the assumption being that turn-around times are determined more by the number of containers handled than the size of individual units.

The point demonstrated by table IV.5 is that average gate-to-gate times seem to vary with the number of containers carried on each trip; the greater the number of containers, the longer the time. At Dynon, the average gate-to-gate time for a truck delivering or collecting a single container was 26 minutes; for four containers, the figure was 54 minutes.

According to forwarders, there is another factor affecting the table IV.5 figures which was not picked up in the survey; namely the number of trains visited during each trip. For example, all else being equal, a truck delivering two containers to be loaded on a train for Sydney will transit

TABLE IV.5 AVERAGE GATE-TO-GATE TIMES FOR TRUCKS VISITING DYNON AND KEWDALE TERMINALS, BY THE NUMBER OF CONTAINERS CARRIED IN AND OUT

(minutes)

No. of containers[a]	*Dynon*	*Kewdale*
1	26	21
2	41	27
3	50	27
4	54	38

a. The sum of the numbers carried to and from the terminal.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

the terminal faster than a truck delivering one container to a Sydney train and another to an Adelaide train. In the latter case, the truck has to go to a second part of the terminal and wait again for a machine to unload the container.

Nevertheless, the figures in table IV.5 indicate clear economies of scale to be gained by trucks carrying more than one container. Terminal transit time at Dynon for a truck with two containers is less than 80 per cent of the time that two trucks carrying similar containers would take. Carriage of four containers is even more efficient. Comparable economies are even more pronounced at Kewdale.

Gate-to-gate times by type of container

Table IV.6 shows gate-to-gate times at Dynon for trucks which carried only top-lift containers, both in and out of the terminal, and for trucks which carried only bottom-lift units. Table IV.7 gives similar data for Kewdale. Data for trucks carrying a mix of top- and bottom-lift units are excluded from both tables.

The figures suggest that trucks carrying top-lift containers transit Dynon faster than those with bottom-lift units. This is a plausible result. Once machinery is in place, it takes about sixty seconds to transfer a top-lift container between truck and wagon, but the same job for a bottom-lift unit averages about five or six minutes. Trucks with bottom-lift units are likely to face longer waiting times beside trains because only one or two of Dynon's mobile machines are capable of handling bottom-lifts.

TABLE IV.6 AVERAGE GATE-TO-GATE TIMES FOR TRUCKS VISITING DYNON TERMINAL, BY THE NUMBER AND TYPE OF CONTAINERS CARRIED

(minutes)

No. of containers[a]	*Top-lift units*	*Bottom-lift units*
1	25	28
2	36	52
3	49	na
4	53	na

na Not available

a. The sum of the numbers carried to and from the terminal.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

TABLE IV.7 AVERAGE GATE-TO-GATE TIMES FOR TRUCKS VISITING KEWDALE TERMINAL BY THE NUMBER AND TYPE OF CONTAINERS CARRIED

(minutes)

No. of containers[a]	*Top-lift units*	*Bottom-lift units*
1	22	20
2	25	29
3	27	na
4	28	na

na Not available

a. The sum of the numbers carried to and from the terminal.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

The figures in table IV.6 would also be affected by the number of trains visited on each trip. For example, if the average time to deliver one top-lift unit is 25 minutes, then the time for two should be only one or two minutes more, provided both units are delivered to the same train. In fact, table IV.6 shows the average time for trucks carrying two top-lift units per trip was 36 minutes. The figure is higher because many trucks delivered one container to an outgoing train, then went to another location in the terminal to collect a container from an incoming service.

For Kewdale, the gate-to-gate times for trucks carrying top- and bottom-lift units are much closer. For a two-container load, the average gate-to-gate time was 25 minutes for top lifts and 29 minutes for bottom-lifts. For single-container loads, the position was reversed, with gate-to-gate times for bottom-lifts averaging 20 minutes compared with 22 minutes for top-lifts.

The BTCE understands that gate-to-gate times for the two types of container are about the same at Kewdale because it has more machinery capable of handling bottom-lift units. Further, the 'market shares' of the two container types differ between the terminals. For the data collected for this study, table IV.1 shows that top-lift containers accounted for 72 per cent of the units shipped through Dynon but only 49 per cent at Kewdale. (The figures differ because the monitoring of terminal efficiency was not restricted to Melbourne-Perth consignments. Rather, monitoring of Dynon covered container movements to Perth and all other centres.)

QUEUEING TIMES

Table IV.8 shows the time spent by trucks queueing outside the gates at Dynon and Kewdale rail terminals. Under current arrangements, truck drivers have to stop at the gates to have their documents checked and to find where they have to go in the terminal to deliver or collect their containers.

TABLE IV.8 QUEUEING TIMES AT DYNON AND KEWDALE

	Dynon		*Kewdale*	
Queue time (Minutes)	*Number of trucks*	*Per cent*	*Number of trucks*	*Per cent*
Nil	568	46.9	157	47.4
1 to 5	336	27.7	100	30.2
6 to 10	145	12.0	45	13.6
11 to 15	89	7.3	17	5.1
16 to 20	35	2.9	10	3.0
21 to 25	12	1.0	1	0.3
26 to 30	6	0.5	1	0.3
30 to 60	20	1.7	0	0.0
Total	**1211**	**100.0**	**331**	**100.0**

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

As with gate-to-gate times, the distribution of queuing statistics is positively skewed. At both terminals, 47 per cent of trucks faced no queueing time at all, and about three-quarters of the trucks were through the gates in five minutes or less. At the other end of the distribution, delays over 15 minutes affected about six percent of the trucks at Dynon and 4 per cent of trucks at Kewdale.

Table IV.9 shows that queueing times at Dynon averaged about 4 minutes per truck at Dynon for the first few days of the week, then increased to 5 and 7 minutes on Thursday and Friday before dropping to an average of one minute on Saturday.

At Kewdale, the peak was at the beginning of the week, reflecting the activity associated with trains that cross the Nullarbor during the weekend and arrive to be unloaded at the start of the week. Queueing times peaked on Tuesday and Wednesday at five and six minutes, respectively, then fell later in the week.

TABLE IV.9 AVERAGE QUEUEING TIMES FOR TRUCKS VISITING DYNON AND KEWDALE TERMINALS, BY DAY OF WEEK

(minutes)

Day	*Dynon*	*Kewdale*
Monday	4	2
Tuesday	3	6
Wednesday	4	5
Thursday	5	2
Friday	7	4
Saturday	1	0
Sunday	0	0
All days	5	4

Note The figures in this table show the averages for the two weeks covered by the survey. For example, the average gate-to-gate time of 31 minutes at Dynon on Mondays is based on data for Monday 27 May and 3 June. The Monday figure for Kewdale is based on one day as that terminal was closed for the Foundation Day public holiday on 3 June.

Source BTCE monitoring of Melbourne-Perth rail services, May-June 1996.

Table IV.10 presents weekday queueing times. At Dynon, average queueing times increase from two minutes in the early morning to an afternoon peak of seven minutes. At Kewdale there were two peaks, with queueing times averaging six minutes before 6 am, falling to three minutes, then peaking again at six minutes from 2 pm to 4 pm. The distributions may reflect different operating arrangements of the two terminals. Kewdale closes overnight and the early morning peak may reflect the queue at opening time. Dynon operates 24 hours per day and early arriving trucks can enter the terminal at any time, reducing the possibility of queues.

TABLE IV.10 AVERAGE QUEUEING TIMES FOR TRUCKS VISITING DYNON AND KEWDALE TERMINALS ON WEEKDAYS, BY TIME OF DAY

(minutes)

Time	*Dynon*	*Kewdale*
Before 06.00	2	6
06.00 to 07.59	3	5
08.00 to 11.59	4	3
12.00 to 13.59	5	4
14.00 to 15.59	7	6
16.00 to 18.00	4	3
After 18.00	1	0[a]

a. Monitoring of Kewdale covered the hours of 6am to 6pm weekdays only.

Source BTCE monitoring of Melbourne–Perth rail services, May–June 1996.

GLOSSARY

B-double	A road freight vehicle consisting of a prime mover hauling two semi-trailers, each supported by a turntable. The second trailer is mounted on a turntable at the rear of the first.
Bottom-lift container	A type of cargo container which cranes lift by taking hold of its base, or bottom.
Consist	The set of wagons for a freight train.
Cross docking	In cross docking, cargoes are transported by road or rail to a warehouse, then transferred direct across the loading dock to local delivery vehicles, without being stored in the warehouse shelves.
Demurrage	The charge for leaving containers at a rail terminal beyond a specified time.
Driver-loader	A truck driver who has a key for after-hours access to the customer's premises to collect or deliver cargo.
Equipment operators	The containers and trucks used by transport
Hardstand	A strengthened area of pavement designed to take the weight of one or more containers.
Intermodal services	NRC's container express trains operating between its terminals in State capital cities.
No-show fee (rail)	The fee charged for booking a container space on a freight train but not delivering the container to the train.

No-show fee (shipping) The fee charged for booking, but not using, a time-slot for a truck to deliver a container to a shipping terminal.

Pre-tripped Cleaned and prepared. Refrigerated containers must be pre-tripped before they can be loaded with a cargo of food.

Reach-stacker A type of machine used for lifting and moving containers.

Red-carded Declared unfit for service.

Semi-bulk cargo Commodities such as steel, paper and timber which are shipped in large, full train load or full ship load quantities, but which cannot be poured loose into wagons or ships.

Short shipping Cargo left behind by the train (or ship) on which it has been consigned.

Single voyage permit A permit issued by the Australian Government under the *Navigation Act* allowing a foreign ship to make one voyage carrying domestic cargo between Australian ports.

Superfreighter A high priority container express train.

Tautliner A trailer or container with sliding fabric curtains on each side. The curtains can be moved aside to allow quick loading of cargo from the side, then drawn taut and locked in place to secure the cargo in transit.

Top-lift container A type of cargo container with lifting attachments on its top corners. International shipping containers built to ISO standards are top-lift containers as are some containers built specially for the domestic trade.

Unit A synonym for container.

ABBREVIATIONS

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AN	Australian National Railways Commission
ANRC	Australian National Railways Commission
BHP	Broken Hill Proprietary Company Limited
BIE	Bureau of Industry Economics
BTCE	Bureau of Transport and Communications Economics
CPI	Consumer price index
edi	electronic data interchange
eta	estimated time of arrival
FCL	Full container load (Also the name of a freight forwarding company)
GTE	Government trading enterprise
ISO	International Standards Organization; in the context of this report, an ISO is a container based on ISO specifications
LCL	Less than full container load
NRC	National Rail Corporation Limited
PTC	Public Transport Commission (of Victoria)
QR	Queensland Rail
SCT	Specialised Container Transport
SRA	State Rail Authority of New South Wales

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