

## **Rail Freight Productivity: A Case Study**

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### **Abstract:**

This paper discusses the recent performance of the rail freight industry in Australia and its potential for productivity and service level gains in the short and medium terms. As a case study, the freight rail system of Tasmania, AN Tasrail, is examined in detail.

After reviewing recent developments designed to achieve profitability in Australian freight rail operations, the paper addresses the performance of AN Tasrail and its future prospects. Strategies required to move the organisation to profitable operations in the near future are discussed. Changes in the competitive environment which the system is likely to face are assessed to determine the likely impact on overall profitability.

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**Introduction**

In a country such as Australia, with vast distances between the major centres of activity, the need for efficient land transport systems is accentuated. Export industries, as well as those which are in direct competition with imports, need to have access to efficient freight transport if they are to reduce overall production costs, and become internationally competitive.

The first part of this paper discusses the performance of rail freight business and its potential for productivity and service level gains in the short and medium terms. The small freight rail system of Tasmania, AN Tasrail, is then examined in detail. AN Tasrail's past financial performance is highlighted, and the strategies required to move to profitable operations are discussed.

**Australian freight rail productivity**

Past trends in rail freight productivity

**TABLE 1 : ROAD AND RAIL FREIGHT TASK (1988/89)**

Source : Industry Commission (1991)

	NTK (Billion)	
	Rail	Road
<u>Government Systems</u>		
Interstate	15	17
Intrastate	35	68
Private Systems (Bulk)	31	-
Total	81	85

Table 1 shows the road and rail freight task in terms of net tonne kilometres (NTK). If the private bulk freight task is excluded, the results show that rail carried some 50 billion NTK in 1988/89 compared with 85 million NTK moved by the road transport industry.

Productivity comparisons between different rail systems, whether using partial factors such as labour resources, or total factor productivity analysis, can be misleading. This is mainly due to differences in the nature of the traffic task, the geographical characteristics, and the degree of government involvement in the management of each system. A more appropriate analysis is the comparison of productivity indices over time for the same rail system.

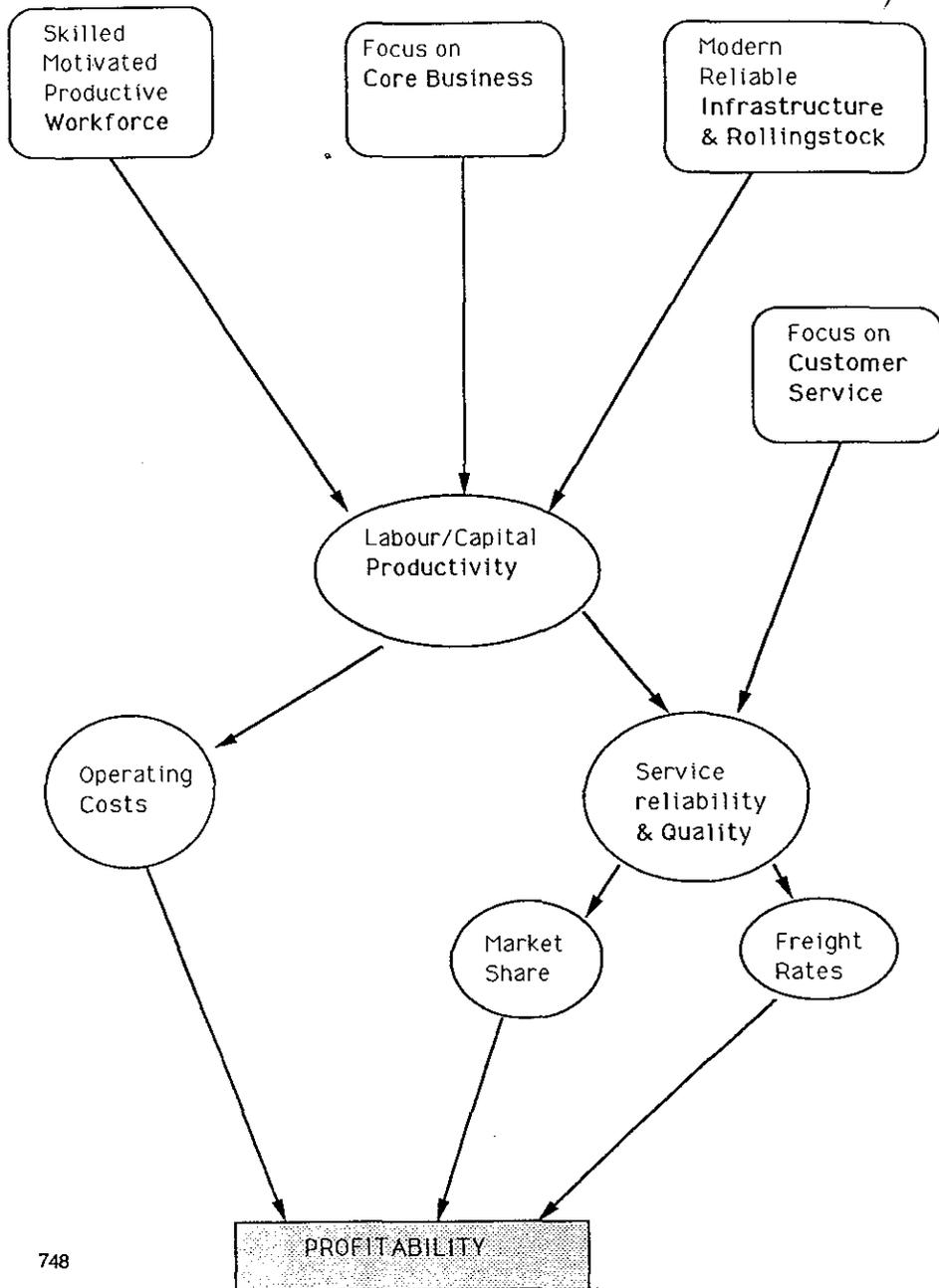
The Industries Assistance Commission (1989) estimated growth rates for Australian rail total factor productivity for the period 1978/79 to 1986/87 to range from 3 percent for the State Rail Authority of New South Wales to around 7 percent for Australian National (AN), Queensland Rail (QR) and the Victorian Railways. Bruncker and Gallagher (1989) estimated an average annual total factor productivity growth rates for AN of between 3.8 percent and 6 percent for the period 1980 to 1988, depending on the assumptions made.

It should be noted that such high growth rates in rail total factor productivity have been achieved from a very low level of initial productivity in the use of resources such as labour. The reduction in employment levels during the last decade has ranged from around 17 percent in QR to around 40 percent in Westrail and AN.

Labour productivity measured in terms of net tonne-kilometres per freight employee has increased considerably in the last few years. In the case of AN, freight labour productivity increased by just over 200 percent from 1978 to 1990. Over the same period, the freight task increased by 69 percent (Norley (1991)).

The main reasons for quite dramatic reductions in labour force can be attributed to a high level of overmanning; changes in work and management practices; the use of capital to modernise equipment (e.g. trade maintenance; locomotive and wagon maintenance; train control systems); and some service rationalisation (e.g. closure of branch lines and cessation of Less-than-Car-Load (LCL) traffic). The rail employment reductions achieved in Australia in the recent past can be compared with the situation in the U.S. following deregulation of the industry in 1980. Since then, Class I railways reduced their labour force by around 40 percent (Industry Commission (1991)).

FIGURE 1: Rail Profitability Determinants



*Rail freight productivity*

Profitability determinants

Of the four major determinants of rail profitability shown in Figure 1, none is more important than a motivated and skilled workforce focusing on the need to continuously improve customer service levels. The other three profitability determinants relate to the need for adequate levels of capital investment in modern plant and equipment; the requirement that government imposed constraints in disinvestment in non-profitable business segments, be either lifted or explicitly recognised as part of community service obligation contracts; and finally the need to focus very clearly on customer service as the main vehicle to retain the increase market share.

Future prospects

The ability of rail freight transport in Australia to become profitable and generate sufficient capital to continue to modernise its infrastructure and rollingstock hinges, to a large extent, on labour productivity gains and customer service improvements. Labour costs represent around 45 percent of total rail costs. The Industry Commission, 1991, estimated that 1991 level of services could be provided with a staff 65 to 70 percent of the existing total labour force. After comparing Australia with U.S. best operating practices, the Commission estimated that a 35 percent overall productivity improvement is achievable.

To increase market share, rail needs to change its long standing image as an unreliable service provider. Whilst technology renewal will be a key component of this new customer service focus, the 'culture' of railway operators needs to undergo significant changes. The establishment of the National Freight Corporation should provide a new single identity and renewed focus on customer needs.

Tasrail - the existing situation

Background

Australian National (AN) is the Federal government owned railway with operations in South Australia, the Northern Territory and Tasmania. AN is mainly a freight railway although it has a major role in the small number of long distance passenger rail services in Australia. Since 1978, it has operated the rail system in the island State of Tasmania. That system (Tasrail), which is entirely a freight railway, is operated under a contract between the Federal government and AN. AN agrees to operate the system as a Community Service Obligation (CSO) for a fixed period of time and within an agreed operating budget. The latest agreement is due to expire at the end of 1992/93. The Bureau of Transport and Communication Economics (1991) has just completed a

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comprehensive cost/benefit analysis of future options for Tasrail at the request of the Federal government. This analysis will assist them in determining what future support they will provide for AN Tasrail after 1992/93.

#### The network and traffic task

The rail system in Tasmania serves a small island with a population of only 456,000 people and whose industrial base is small and distributed. The island topography places an added disadvantage on the rail system.

The current rail network in Tasmania, which is shown in Figure 2, comprises 784 kilometres of track. The backbone of the system connects the northern ports of Burnie, Devonport and Launceston with the port of Hobart - the major urban area in Tasmania.

Currently, Tasrail conveys about 25 percent of the total land based freight task in Tasmania and it is therefore an essential part of the state's economy. Industry is decentralised to a large extent and the need to move raw material into plants and finished products from these plants, provide the major freight transport requirements. The existence of several ports generates container and bulk material traffic demands. In 1990/91, Tasrail carried almost 1.75 million net tonnes of freight corresponding to 37 million net tonne-kilometres. Table 2 shows the traffic task by commodity carried in 1990/91. As that Table shows, the major products carried are woodchip logs, coal, containers, cement, pulpwood and other logs, sulphuric acid and fertiliser.

In terms of revenue, the railway is very much dependent on the logging industry, with woodchip logs, pulpwood and other logs accounting for some 40 percent of total revenue.

In 1990/91, coal and container traffic made up 20 and 15 percent of total revenue respectively. Tasrail, which has not carried less-than-car-load traffic since 1986, is mainly a bulk railway with containers being the only non-bulk traffic conveyed.

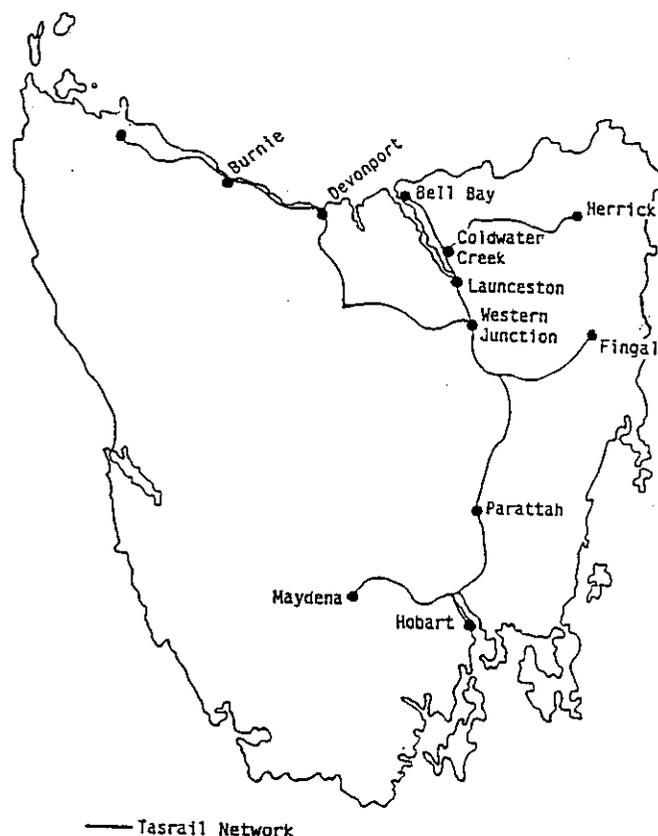
The Tasmanian State Government has in place a form of freight industry regulation policy which provides for a Rail Protection Levy on those road transport operators which are in direct competition with Tasrail for specific commodities. The levy can add about 18 to 28 percent to road freight rates according to the Bureau of Transport and Communications Economics (1991). This scheme is currently under review by the Tasmanian government and is likely to be abolished in its present form. There are proposals being negotiated at a national level regarding road cost recovery from heavy vehicle usage, and it is likely that road user charges for the movement of rail competing and other commodities will increase.

### Rail freight productivity

TABLE 2 : COMMODITIES CARRIED BY TASRAIL - 1990/91

COMMODITY	TONNAGE (000)
Woodchip	464
Coal	296
Cement	290
Container	247
Pulpwood	202
Sulphuric Acid	89
Fertiliser	81
Other	86
Total	1755

FIGURE 2 : The Tasail Network



### Tasrail - past performance

#### Traffic task productivity

Since its inception in 1978, Tasrail's freight task has increased from 250 million net tonne-kilometres to a peak of 459 million net tonne-kilometres in 1988/89. During the last two financial years to June, 1991, the traffic task has reduced to 370 million net tonne-kilometres, mainly due to a downturn in the Australian economy which has entered a recessionary phase in 1990/91.

The labour force employed by Tasrail stood at just under 700 in June, 1991 compared with about 1700 in 1978. Staff reductions have been achieved throughout this period by means of natural attrition and voluntary redundancy schemes. Labour productivity has increased from 0.15 million net tonne-kilometres per employee in 1978 to around 0.5 million net tonne-kilometres per employee.

Tasrail's fleet of 52 locomotives has an average age of about 18 years. The wagon fleet consists of 729 wagons, more than half of which are log wagons. More than 400 high-capacity wagons have been 'imported' from AN's mainland system to replace obsolete low-capacity rollingstock. Track conditions were poor throughout most of the system before the formation of Tasrail in 1978. Track rehabilitation funds have been provided by the Federal government since then, and the condition of the track significantly improved by the replacement of timber with steel sleepers and continuous welding of track. More than 78 percent of track is now rated as 'good' condition compared with 6 percent in 1976.

Track productivity is around 0.5 million NTK/route-kilometres. This is much less than Mainland railways but reflects the shorter distances and distribution of freight in Tasmania.

#### Financial performance

Tasrail has recorded losses in its operations since its inception. The deficits have been reduced to around \$18 million in 1990/91 from \$41 million in 1977/78 (expressed in 1989/1990 dollars, Bureau of Transport and Communications Economics (1991)). The reduction in the deficits reflects mainly the reduction in total operating costs per net tonne-kilometre. Between 1977/78 and 1990/91, total operating costs per net tonne-kilometre have reduced from 27 cents to 12 cents. The latter can be compared with an average of cost of around 5 cents per net tonne-kilometre for AN in mainland Australia where average hauls are around three times those of Tasrail.

The revenue received by Tasrail from traffic operations was subjected to rate contracts for most of the 1980's, which precluded commercial rate increases and led to reductions in real terms. The revenue per net tonne-kilometre, which was around 10 cents in 1977/78, has decreased to around 7 cents in 1990/91.

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During the same period, less-than-car-load traffic was abandoned. This traffic which earned high revenues per NTK also generated very high costs and could not compete with road traffic.

## Tasrail - the way ahead

### General

The success which AN has had in achieving positive rates of return on assets from its freight operations in the mainland of Australia has been attributed to five main factors. (Norley, 1991).

- . Commitment to a clear objective
- . Focus on productivity gains
- . Quantification of cost recovery levels by traffic task
- . Cessation of uneconomic business activities
- . Agreement with government on definition of and provision for community service obligations

Similarly, in the case of Tasrail, the organisation has provided a clear focus to all its employees in the form of its corporate goal which is to break-even by 1995/96. The 'mission' which Tasrail has set itself states that: 'Tasrail will endure as the major carrier of heavy freight for Tasmanian industry by providing customer-responsive, cost-effective and environmentally sound rail transport services'. Although the corporate goal is to break-even by 1995/96, proposals for a major restructuring of Tasrail are currently being progressed with the objective of achieving that goal within a shorter time frame. The Federal government has indicated that financial support beyond 1992/93 is dependent on continuing improvement in Tasrail's financial performance. In the longer term, Tasrail needs to not only eliminate its deficit but generate sufficient profits to fund future capital investment programmes.

### Future demand

Due to the limited potential for increased rail business as a result of major modal shifts from road, Tasrail relies heavily on the general level of economic activity in Australia, as well as on the business activity of a small number of large customers. For example, the reliance on timber logs for a substantial proportion of the revenue, highlights the railway dependence on the future of the paper industry in Australia and overseas. Only six firms made up some 90 percent of the freight task in 1990/91. Recent forecasts of traffic task made on behalf of the Bureau of Transport and Communications Economics, suggest that the total freight task is likely to increase steadily up to 1994/95. The task

## Rail freight productivity

is then predicted to decline slightly and remain constant during the next decade, (Bureau Transport and Communications Economics (1991)). It is extremely difficult to predict traffic demand with any degree of certainty and therefore the major planning emphasis with railway management has been directed towards the likely future trends in total factor productivity given a specified level of revenue. The latter has been assumed to increase only very moderately in real terms during the next 10 years. A number of initiatives are planned to maintain or increase rail market share. These initiatives include:

- . Development of service packages for woodchip logs and container traffic, including door-to-door service where appropriate;
- . Ensuring that expansion plans of specific industries can be accommodated on rail;
- . Encourage customer investment in rail (infrastructure and/or rollingstock); and
- . Develop electronic data interchange facilities with major customers to enable direct access to train and consignment note data.

### Productivity gains

Tasrail's productivity has improved significantly over the last decade mainly through rationalisation of services; upgrading of track and rollingstock, and reductions in labour costs, whilst at the same time, task has increased. These gains in productivity have been made from a very low base. Although future gains will be increasingly more difficult to achieve, there are significant opportunities for improvement during the coming decade. Perhaps the area of largest potential remains employee productivity despite the gains already achieved. A major staff restructuring proposal is being pursued which will involve:

- . Development of multi-skilled teams trained and empowered to achieve agreed performance levels;
- . Improvement in the amount and quality of staff training;
- . Contracting out of tasks whenever that is demonstrably more cost-effective;
- . Investment in new technology to help work practice changes;
- . Reduction in the number of manned locations.

Current projections for the number of staff in Tasrail under the restructure plan point towards a total staff of around 400 in 1993 reducing to 350 shortly after that. (The staff in January, 1992 stood at 490). Therefore, it is envisaged that the current traffic task can be handled by 50 percent less staff than existed in June, 1991. The timing of further labour force reductions will depend on the progress of union/management negotiations on work practice changes as well as on Tasrail's ability to substitute capital for labour in the future. The planned capital programme addresses the main areas of modern wagon and locomotive maintenance facilities, modern communications, the replacement of locomotives and continuing efforts to upgrade track and related structures.

It should be stressed that current projections for future improvements in labour productivity rely on the modernisation of Tasrail using existing proven rail technology. As we move into the 21st century, Tasrail will begin to achieve positive rates of return. This, coupled with the availability of new technology, should ensure that the rail system can continue to make its labour and capital productivity gains.

#### Profitability

The timing of a move from a government subsidised operation to a profit making enterprise will depend to a large extent on three major factors, namely the business cycle for the paper and paper products industries, the possibility of major new industries (e.g. steel mill), and the rate of reduction in workforce levels within Tasrail. In its latest corporate plan, Tasrail forecasts break-even to occur towards the middle of 1990's. Whilst changes in the regulatory environment and the introduction of road users changes will impact on rail's competitive position, it is thought that rail profitability will not be significantly affected as a result.

Tasrail operates on a network which is unlikely to be extended in the short to medium term. It is well placed to service the main industrial centres in Tasmania. It is expected that rail will retain its dominance in the transport of bulk commodities, with potential market share increases in container traffic and possibly woodchip logs. Higher levels of economic activity in Tasmania's industries leading to expanding businesses or new industries, will increase the flows of commodities which are well suited to rail, such as coal, cement and wood chip logs.

In a recent study, The Bureau of Transport and Communications Economics (1991), reviewed Tasrail's operations and undertook a cost/benefit analysis of future options. Closure of the railway was one of the options analysed both from a community and shareholder's perspective. The overall cost/benefit analysis took into account the effects of rail closure on such factors as employment in the state, and on road damage from increased heavy vehicle traffic.

The social cost/benefit analysis showed a net loss from rail closure of \$18 million (1989/90 dollars) using a 10 percent discount rate over a twenty year period. This result is based on fairly conservative traffic demand forecast and the most pessimistic rail productivity scenario. Using the latest Tasrail planning productivity forecasts, the net loss from rail closure would rise to \$34 million.

The same study concluded that the financial benefit to the government of closing the railway would be in the order of \$13 million, using a 10 percent discount rate over a 20 year period. This loss would convert into a \$7 million gain from keeping the railway open if the labour force productivity gains envisaged by Tasrail are achieved.

#### Conclusions

Rail in Australia has shown significant improvements in financial performance and productivity over the last ten years. However, it should be realised that rail's achievement reflects, in part, a very low level of initial productivity in the use of resources such as labour.

A skilled workforce committed to excellent customer service, adequate levels of capital investment in strategic plant and equipment purchases, and a recognition of non-commercial activities (either through disinvestment or specific government funded community service contracts) are the key determinants of profitability for a rail system. A renewed focus by Australian railway systems on these factors should ensure that they continue their progress to sustained profitability over the next few years.

Tasrail is a comparatively small bulk haul railway operated by Australian National in Tasmania. Its network links the major ports and industrial centres of Tasmania and it provides a vital transport service to the state. The short distances and small customer base require Tasrail to become extremely efficient if it is to compete well against the road industry and guarantee a secure future for itself and its workforce.

Tasrail has already made major gains in productivity over the last decade with a workforce of 1686 in 1978 reducing to 695 in June, 1991. At the same time, the task increased by 50 percent. The deficit for Tasrail has also reduced in real terms over the same period going from \$43 million in 1977/78 to around \$18 million in 1990/91, (1990/91 dollars).

Continued use of innovative, cost effective technology and equipment; further work practice changes; emphasis on customer service and staff training; and provision of a clear strategic vision for the organisation will all need to be progressed to bring Tasrail to a break even situation and to sustain its role as the heavy transport backbone of Tasmania. This view is supported by a recent study into the future of Tasrail, which projected net benefits to the government if Tasrail restructures and capital investment in strategic projects is undertaken, (Bureau of Transport and Communications Economics (1991).

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