THE ECONOMICS OF THE CAMBRIAN COAST LINE*

By K. RICHARDS

This paper is a critical analysis of the cost–benefit study by the Ministry of Transport of the Cambrian Coast Line. The Report on that study was published in 1969 [7]. It is important in the development of cost–benefit analysis of railways in rural areas, since it may be taken as a model for subsequent analyses of loss-making rural train services. It ought to be accurate, both conceptually and statistically, since any mistakes may lead to possible closure of other railways where society would benefit from their retention, and vice versa. In fact the Minister announced in December 1970 that the subsidy to the line was to be withdrawn, and a closure proposal followed soon after.

There are reasons to believe that the Report does in fact contain both conceptual and statistical errors. In this paper only one part of the analysis will be considered: the case in which the line would be retained for ten years. The criticisms apply, however, to the other two cases considered in the official study: retention of the line indefinitely, and retention of only the Machynlleth/Barmouth section for a period of ten years.

To maintain comparability with the official study, we will proceed as far as possible with the same data: for example, the estimates of total passengers using the line annually. Also the same discount rate will be used, namely 8 per cent, in spite of the more recent adoption of 10 per cent in Government decision taking.

It must be emphasised that this paper, while criticising a specific study, is more general in its application, as the techniques used may be applied to other cost–benefit analyses of railway closures.

THE RESULTS OF THE OFFICIAL STUDY

Numerical Results

Table 1 reproduces the basic data from Table 15, page 32, in the Report. This shows that the net cost of retaining the line amounts to a discounted value of nearly £700,000. The Report concludes that before a case could be made out for the retention of the line the value of intangible factors, which it mentioned but did not attempt to quantify, would have to exceed this sum of money. Given the size of the net cost, it seemed unlikely that they could do so.

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*I am indebted to Mr. Roy Thomas of University College, Cardiff, and Mr. Robert Sugden of the University of York, for allowing me to see their excellent papers on this subject before publication and for discussing the problems with me. I am also grateful to Professors G. L. Rees and P. N. Mathur, of Aberystwyth, for their constant encouragement and helpful comments at every stage of this analysis.
TABLE 1

Retention of the Complete Line for a Ten-Year Limited Life

<table>
<thead>
<tr>
<th>Costs</th>
<th>Discounted Value (at 8%) £'000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rail Costs</td>
<td></td>
</tr>
<tr>
<td>(a) Total cost</td>
<td>1,768</td>
</tr>
<tr>
<td>(b) Less Costs arising from the use of labour resources with no opportunity cost</td>
<td>534</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>1,234</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cost of additional travelling time if the rail service were closed</td>
<td>37</td>
</tr>
<tr>
<td>2. Loss of benefit of journey by rail passengers not transferring in future</td>
<td>38</td>
</tr>
<tr>
<td>3. Road costs avoided</td>
<td>50</td>
</tr>
<tr>
<td>4. Additional bus costs avoided</td>
<td>413.5</td>
</tr>
<tr>
<td><strong>Total Benefit</strong></td>
<td>538.5</td>
</tr>
<tr>
<td><strong>Net Cost of Retention</strong></td>
<td>695.5</td>
</tr>
</tbody>
</table>

*Note:* The rail costs assume a rationalised system of operation and are net expenses which the Railways Board, or other bodies, would have to meet.

**General Criticisms**

In evaluating benefits and costs, the Report merely quotes one value for each factor. The imprecision of economic statistics, together with some of the difficult methodological problems associated with cost–benefit analysis, combine to give spurious accuracy to single estimates of the social cost or benefit of retaining the line. We will produce "optimistic" and "pessimistic" estimates of each variable and estimate the social worth of the line on a combination of all the optimistic assumptions on the one hand and all the pessimistic ones on the other.1

Secondly, the study takes an implicitly static approach to the problem. It assumes that the level of costs and the annual number of passengers will remain constant over the period of ten years. This is obviously unsatisfactory; some allowance for trend factors, crude though it may be, is necessary. In cost–benefit analyses of road improvements, estimates are invariably made of the likely future growth in the level of road traffic.

Thirdly, the study implicitly assumes that the relative prices of road and rail travel will remain the same, and makes no allowance for possible changes in relative costs. Recent legislation relating to noise and pollution levels in private motor

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1 "Optimistic" in this analysis means any assumption which increases the net benefit of retaining the line, and "pessimistic" any which decreases it.
vehicles and lorries is relevant. If the marginal social cost of private traffic is greater than its price, there may be a case for a compensating reduction in the price of public transport.

Fourthly, distributional factors were ignored by the Report, which contained an implicit acceptance of the status quo. The inevitable redistribution of income from rural to urban dwellers consequent upon the closure of the rural railway line was simply regarded as a transfer payment. The loss of tourist income to the North Wales coast and the gain by other areas such as Brighton, for example, comes into the same category.

There are reasons why the gain in income should be weighted less than the loss in income. First, the average income of urban dwellers is higher than that of rural dwellers. Moreover, most of Wales is a development area in which the level of unemployment is usually about twice the national average. Together with the low participation rate, these are among the main reasons why the level of per capita income is lower in Wales than in the rest of the United Kingdom.

**Specific Criticisms**

An integral part of cost–benefit studies of road programmes is the cost of road accidents. Since the closure of a railway line involves an increased burden on the roads, and since accidents are an increasing function of traffic, it seems logical to include as a benefit of retention the value of accidents avoided by keeping the line open, less the value of accidents due to the operation of the line. This factor was not mentioned in the Report.

In a cost–benefit study resources should be valued at their opportunity costs rather than money costs. The Report recognised that the cost of labour which would otherwise be unemployed should be zero, and hence subtracted an appropriate sum from total costs ([7], item 1a, Table 1). However, while an allowance is made for the period of time for which those displaced by closure are likely to be unemployed, no account is taken of the indirect effects on unemployment of displaced rail workers taking up jobs which would otherwise have been filled by other potential employees. The effects would only be mitigated to the extent that emigration took place; and that would bring additional costs in the form of underutilisation of social capital in the area of emigration and pressure on social capital, extra congestion, etc., in the receiving areas.

The same sort of consideration applies to capital assets, which may be of some operational use elsewhere during the ten years and after the year of closure. These were valued at full cost in the Report, but no allowance was made for their value after the line closed.

Perhaps the most serious conceptual error in the Report is the disregard of revenue considerations. In particular, the cost of closure, or benefit of retention, should include some allowance for the net loss of revenue sustained by public transport operators as a result of former travellers not now making the journey at all or not making it by public transport. The value of this revenue after closure is in the hands of these former travellers, who now spend it on other things, for example, on fuel for a car journey or on buying a new car. If we assume, in the absence of any information to the contrary, that price equals marginal social cost, this becomes the resource cost of closure.
PROBLEMS OF VALUATION

The Cost of Accidents

One of the pioneering works on the cost of accidents is, of course, that of D. J. Reynolds [11], who calculated the cost in terms of several factors: damage to property, medical costs, administrative costs, and the net reduction in output of goods and services due to loss of output from people killed and injured, making due allowance for goods and services that would otherwise have been consumed by those killed. This pioneering work has been continued by R. R. L. Dawson of the Road Research Laboratory [4], who also tried to estimate the value of subjective factors like the cost of suffering and bereavement. In earlier work Dawson had calculated the loss of output as the result of a fatal casualty on a net basis, i.e., future production less the future consumption which society does not have to provide, but the latest estimates do not deduct consumption. The reasoning behind this change is that the accidents which need to be costed are those which might have occurred but are prevented by some measure, in the present case the retention of a railway line. On this basis the individual is alive and able to enjoy that consumption, which should therefore not be deducted in arriving at the valuation of benefit.

Dawson suggests that the average figure to be used in economic assessment of road improvement schemes is the total cost of all accidents divided by the number of injury accidents, and this is the procedure we will use in the present analysis. In urban areas in 1968 this figure came to £1,250, and in rural areas to £2,080. Although estimates are also provided of the costs at 1970 prices, to be consistent we will ignore the trends in absolute prices on which this estimate is based. However, Dawson suggests that in estimating costs of accidents occurring in future years it can be assumed that the real cost will increase at 3 per cent per annum in line with increases in productivity. This procedure will be adopted in the present analysis, so that accidents which would have occurred in urban and rural areas in 1969 are valued at £1,288 and £2,142 respectively, proportionately higher values being used for later years.

Time

Past cost–benefit studies of transport projects have used a wide variety of valuations of time. For example, Clayton and Rees [3] used a value of between 20p and 75p per hour for working time saved, and valued non-working time at half the average working-time figure of 45p, i.e., 22½p per hour. In evaluating road investments, Dawson [5] used a value for non-working time of three-quarters the working time rate. For other valuations of non-working time see Tipping [14], page 843.

The latest thinking on the valuation of time suggests that, while the marginal product concept is appropriate for evaluating working time, non-working time should be derived behaviourally from analysis of revealed preferences. (See [6] and the papers quoted therein.)

These revealed preference studies have in the main been analyses of choices made of mode or route of travel, e.g., those by Beesley [2] and Quarmby [8], and for public transport have shown best estimate values of roughly 20–25 per cent of hourly

2 The avoidance of bias between road and rail investment would require that for the same type of traveller in a similar situation the same value of time be used.
earnings. The Report adopts a figure of 15p as lying within this range. However, the object of the present study is to present a range of values. The analyses mentioned by the Report produced an upper range of 30 per cent of hourly earnings; this figure will form the basis of our optimistic estimate of non-working time, the actual value used being 21p per hour. This figure may be justified, not only as an alternative estimate in itself, but because of the secular increase in the value of time as income increases (see Becker [1]). If we assume that the value of non-working time increases at the rate of 3 per cent per annum from a base of 15p, this will be roughly equal to the figure derived at the end of 10 years.

Finally, in the Report the value of schoolchildren's time was ignored. Their loss of time consequent on closure must also be considered, because, although they are not directly productive at present, they notionally lose homework time, which is a reduction in their investment in education and hence a reduction in their future productivity. We therefore arbitrarily value children's time as half that of adults.

Labour and Capital Costs

The problem of shadow pricing labour which would otherwise be unemployed is a difficult one, since estimates have to be made, not only of the length of time these men would be likely to be unemployed, but also of the extent of migration. Furthermore, the indirect effects of railwaymen taking up jobs which other potential employees might have obtained must also be taken into account, as well as the multiplier effects of a fall in income on the level of unemployment. This would in turn have repercussions on the length of time for which any one man would remain looking for work. The issue is further complicated by the fact that closure of the line would have a serious effect on employment in the tourist industry, and hence exacerbate the situation. On the other hand, the closure of the rail service would mean an increase in employment on the bus service, which would partially offset the reduction in employment on the railway.

In estimating capital costs, the correct procedure in a cost–benefit analysis is to calculate the capital expenditure incurred at a specific time, rather than to use an annual depreciation allowance in estimates of running costs, as is seemingly done by the Report. Furthermore, at the end of the ten-year period the value of capital equipment, in this case diesel multiple units, should ideally be estimated as the discounted value of the future flow of services to be obtained from that capital. In practice, we will attempt a proxy for this value by assuming different rates of depreciation in our pessimistic and optimistic estimates.

REVISION OF THE OFFICIAL ESTIMATES

The estimates contained in Table 1 will be revised in the light both of the conceptual omissions outlined above and of several statistical errors which appear in the Report. In addition, the figures need to be revised in view of two developments since the time of the Report, a fall in the number of men employed on the line and an increase in the number of passengers using the line.

3In valuing all travellers' time at the non-working rate, the Report effectively assumes that no one uses the line for business during working hours.

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The passenger figures used in the Report are based on a census carried out in August and October 1967, and the figures obtained were assumed to be average values for the 13 summer and 39 winter weeks. Surveys carried out by the British Railways Board in the weeks ended 15 August and 31 October 1970 showed that overall traffic had increased by some 64 per cent compared with the survey weeks, so that if we make the same assumption about average weeks we can say that traffic has increased by 64 per cent. This is split into an 80 per cent increase in summer (22,635 in 1970\(^4\) compared with 12,150 in 1967) and a 30 per cent drop in winter (2,017 compared with 2,869). These figures will be assumed to apply from 1969, and to remain constant thereafter, in the pessimistic estimates; for the optimistic assumption, it will be assumed that traffic has increased by 64 per cent by 1969 and increases thereafter at 8 per cent per annum, a not unreasonable assumption in the light of British Railways' recent experience in general and that of this line in particular.

Each individual component of Table 1 will now be analysed in detail.

(a) Item 1a. Total costs = £1,768,000

The derivation of this particular figure is obscure in the extreme and cannot be reconciled with the information given in the text. The discussion in paragraphs 4.4 and 4.5 leaves the reader wondering how the figure has been derived. It is not clear, for example, whether in calculating movement costs a depreciation allowance has been used or whether the cost of diesel multiple units has been calculated at the time of their renewal.

The latter procedure is the correct one, and we will proceed on this basis, taking the movement cost without depreciation and estimating resource cost of capital expenditure in the appropriate time period. We will assume for our pessimistic estimate that seven new diesel multiple units\(^5\) will need to be purchased in 1974 at a cost of £50,000 each (the upper estimate given in the Report) and that they depreciate by half by 1979, the date of the closure. As an optimistic estimate we assume that they cost £40,000 and depreciate on a straight line basis; since the units have an estimated life of 18 to 19 years, this means that they will be worth approximately two-thirds of their purchase price in 1979.

The once-and-for-all expenditure on rationalisation of the system of £61,000 (upon which the movement costs are based) must also be taken into account together with the continuing costs of closure, maintaining coastal defence works, etc., of £25,000 per annum.

The revised data are presented in Table 2.

One of the assumptions we will make about costs is that the relative prices of the various factors—labour costs, fuel and capital—remain unaltered; only absolute prices increase. In recent years staff costs have formed roughly 60 per cent of total working expenses ([10], p. 128). At the time of the study some 196 railway staff were employed on the line; at the time of writing (summer 1971) the number is about 140, a drop of about 30 per cent. If no more men are sacked, on this basis total costs should be reduced by 18 per cent. On the other hand, if we assume that the service

\(^4\) This was partly due to the introduction of a Sunday service, which was not available in 1967.

\(^5\) Enough to replace the present stock.
can be provided with 110 men (a drop of 44 per cent), as some experts have pro-
pounded, then total operating costs included capital costs should be reduced by
26 per cent. Thus all values in Table 2, except rationalisation expenditure and
continuing costs, should be reduced by the relevant amounts. The revised total cost
figures are £1,343,000 and £1,164,000 for pessimistic and optimistic estimates,
respectively.6

(b) Cost. Item 1b. Costs arising from the use of labour resources with no opportunity cost
In this section we will accept D. R. Thomas's [13] estimate of the additional
element to be allowed for the zero opportunity cost arising from indirect effects on
unemployment. Thomas contends that there is little likelihood of many redundant
workers over 40 moving out of the area. He makes the optimistic assumption that
50 per cent of those under 40 would move within two years, and on the basis of the
redundancy figures and assumed rates of resettlement used in the Report ([7], pp. 22)
estimates that the indirect effects on employment reduce the opportunity costs of
retaining the line by some £300,000 over ten years, which makes the allowance
under this heading £824,000. However, because of the reduction in the labour
employed on the line this figure should, in our optimistic and pessimistic estimates,
be reduced by 26 per cent and 18 per cent respectively, to £617,000 and £684,000.

(c) Benefit. Item 1. Cost of additional travelling time if the rail service were closed = £37,000
The original figure of £37,000 will be used in our pessimistic estimate of benefit.
If we value time at the alternative value of 21p an hour, net benefit is increased to
£52,000. If we adjust for trend effects, the pessimistic figure should be multiplied

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6 Both our estimates will be understated to the extent that we have not made an estimate of the cost
of Sunday services, while including the benefits for passengers on the benefit side.
by a factor of 1.64 and the optimistic one by 2.44. The revised figures are therefore £61,000 and £127,000.

Finally, we must value children’s time, and we assume a constant number of children travelling over the ten years. It is said in the Report that, if the line closed, 20 per cent of travellers in winter and 45 per cent in summer would still travel, i.e., about 6,600 in all. Children would number about 850, which is roughly 13 per cent of the total, so that if we value children’s time at half that of adults we get pessimistic and optimistic values of 6.5 per cent of £37,000 and £52,000, namely, £2,000 and £3,000.

(d) Benefit 2. Loss of benefit of journey by displaced rail travellers not transferring in future = £38,000

The conceptual basis for this estimate is outlined in paragraph 2.9 of the Report, and paragraph 2.10 gives an annual estimate of £7,000 in 1969, based on replies to a questionnaire showing the number of travellers who would not travel at all.

The first point to notice is that this figure of £38,000 should be the discounted value of £7,000 for ten years at 8 per cent; this should be, in fact, £47,000 (£7,000 × 6.7101) and not £38,000. If we adopt the conventional procedure of valuing loss of benefit to these former travellers as half the loss for those who continue to travel, this figure should now be reduced to £23,500 (£47,000 ÷ 2, compared with £38,000 in the Report). Strictly speaking, we could still use the larger figure, for the rationale for using the maximum figure was not spelled out in the Report. However, we will use £24,000 as a pessimistic estimate and the full value of £47,000 as an optimistic one. If we value time at the optimistic rate used previously, however, i.e., at 21p per hour rather than 15p per hour, the net loss of benefit to travellers after closure rises to £66,000. To allow for trend effects we use the multipliers mentioned previously, namely 1.64 and 2.44, to find pessimistic and optimistic figures of £39,000 and £161,000 respectively. A final point to note under this heading is that these losses to travellers and non-travellers alike are based on the presumption that there would be alternative bus services providing an effective substitute for the rail service. This may not in fact turn out to be the case. (See section (f) below.)

Secondly, by taking a maximum estimate of the loss of benefit, the Report commits a grave conceptual error, as Robert Sugden [12] demonstrates. Assuming that road and rail fares are roughly the same (see [7], paragraph 2.1) and that the subjective factors of discomfort are also equal (an assumption which will be relaxed later), the loss of benefit for someone who does travel is merely the difference between the value of time taken by one mode and that of another (\( J_B - J_R \) in Sugden’s terminology\(^8\)). As mentioned previously, for those who do not travel after the closure the loss of benefit is conventionally taken to be (\( J_B - J_R \))/2.

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\(^7\)Revised benefit = Previous benefit \( \times \frac{1}{6.7101} \times 1.64 \times 10 \times \sum_{i=1}^{10} \frac{(1-0.08)^i}{\sum_{i=1}^{10}(1-0.08)^i} = 2.44 \).

\(^8\)\( J \) = cost of time taken on the journey, the subscripts B and R referring to bus and rail respectively. In fact the costs of road travel are now higher than by rail, because bus fares are considerably higher.
The Report, however, by taking the maximum estimate \((J_B - J_R)\), puts those who no longer travel on the same basis as those who do. However, these travellers will spend the money they previously spent on rail fares (which will be equal to the net loss of revenue by public transport operators) on other commodities or services, so that the resource costs of closure must include this amount of money. Both Sugden [12] and Thomas [13] attempt estimates of the direct loss of revenue by the rail service from passengers who would now cease to travel. This they do by estimating the flow of passengers from Maps 1 and 2 in the Report and multiplying by the national average fare of £1 per passenger mile. Thomas’s estimate is £120,000 and Sugden’s £93,000. Given the difficulties of estimating precise figures from maps, we will take the former as our optimistic and the latter as our pessimistic one. Sugden also attempts an estimate of the net loss of revenue by public transport operators on feeder routes to the Cambrian Coast, principally the Shrewsbury/Machynlleth service, where there were, according to the Report, unlikely to be any offsetting reductions in operating costs. This revenue amounts to about £50,000, and this figure will be used for both pessimistic and optimistic estimates.

Thus far we have figures of net benefit of £143,000 and £170,000, which must be adjusted in the light of trend factors. If we assume that revenue will increase in the same proportion as passengers, the adjustment factors of 1.64 and 2.44 should again be applied, giving revised figures of £135,000 and £415,000. These will be placed under a new heading of benefit: item 2b.

c) **Benefit 3. Road costs avoided = £50,000**

The item of road costs avoided is related to congestion (and its effects on existing road users) caused by traffic displaced from the railway and the additional bus miles thus generated ([7], paragraph 6.2). No estimate is made of the additional maintenance required on the roads, a factor which should also be taken into account. Nor has any estimate been made of the additional congestion resulting from extra lorries on the roads as a result of the diversion of freight traffic from the railway, or of the additional congestion as a result of the increased number of cars on the road. While details of freight traffic on the railway are not available to the public, some indication of the extra strain on the roads can be had by considering the amount of freight (985 tons in 1970) carried by the railway for one agricultural merchant alone. These goods consist mainly of solid fuel, fertilisers and sugar beet pulp. In a letter to the Transport Users Consultative Committee this merchant stated that it would cost up to £3 more per ton to transport these goods by road, and that increasing use was likely to be made of rail freight facilities in the future.¹⁰

Since the estimate of road costs is a “completely theoretical estimate” ([7], p. 29) anyway, in the absence of more detailed information we may be justified perhaps in putting in a conservative figure of £5,000 to cover the extra congestion from lorries.

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¹⁰The possibility of use of the line for future shipments of precious ores by mining companies operating in the area must also be taken into account.
and cars and additional road maintenance required. This makes the revised estimate of road costs avoided £55,000.\textsuperscript{11}

If we assume that increases in road costs are proportional to traffic, road costs avoided should be increased by the pessimistic and optimistic trend factors also. They then become £90,000 and £134,000, respectively.

We now turn to the cost of road accidents. In one study of the effects of rail closures on road traffic, Ray and Crum [9] estimated that the closure of railway lines advocated in the Beeching Report would add roughly 1 per cent to road traffic, but that this would add just under that proportion to accidents because of the declining ratio of accidents to passenger and freight miles travelled.

It is almost impossible to estimate accurately the number of additional road accidents likely to result because of the closure of the line, because it must be remembered that additional accidents are likely to result not only in the area served by the line but also in other parts of the country as additional traffic from these areas, both passenger and freight, is diverted to the road. In Merioneth alone in recent years reported road accidents, both injury and non-injury, have been about 600.\textsuperscript{12} Since the line serves other counties besides Merioneth, a "guesstimate" of the number of additional accidents in the area served by the line might be about 1 per cent of 600, i.e., 6 per annum. As a low estimate we assume one extra accident each year in other (urban) parts of the country, remaining constant for ten years, and as a high one we assume four additional accidents in urban areas, rising at one a year for ten years.\textsuperscript{13}

Using the valuations mentioned previously, the discounted values amount to £109,000 and £180,000, respectively. The imprecise, conservative and, to some extent, arbitrary nature of these estimates will be readily apparent, but they are included as some crude guide to the orders of magnitude involved.

(f)\textit{ Benefit 4. Additional bus costs avoided} = £413,500

The additional bus costs are, in the words of the Report, "the gross costs of providing a new stage carriage services that might be needed if the railway closed" ([7], paragraph 6.4).

It seems likely, however, that not all these services would be provided after closure of the rail link, because of the poor financial returns ([7], paragraph 5.4). This would mean that the loss of benefit to travellers would be increased because of the extra time costs involved. In addition it seems likely that an increasing proportion of people would cease to travel in these circumstances. This would increase the net benefit of retention of the line if the value of increased journey time would be less than twice the average of bus and rail fares for the journey. (For a more detailed analysis see [12].)

\textsuperscript{11}At the time of the study no Sunday services were running, and the congestion on Sundays was excluded. Now that Sunday services are being run, the additional congestion resulting from the closure of the line is likely to be greater on this score also.

\textsuperscript{12}Obtained from correspondence with Gwynedd Constabulary.

\textsuperscript{13}The conservative estimates might be justified on the ground that the reduction in railway accidents is ignored.
As an offset to this, however, the additional bus costs involved would be less. Schoolchildren would obviously have to be carried, however, and, as the travelling would be done at peak times on contract buses, it will be assumed that the Crosville bus company would have to purchase 16 new buses to meet the extra demand. At a rough cost of £6,500 per 41 seater bus, the capital cost would work out at about £104,000, a cost which would have to be met immediately on, if not before, closure. To this must be added the operating cost of these buses over 10 years. Even if we ignore cost of drivers' wages, taking their opportunity costs as zero, the total fuel cost alone, worked out at 3p per mile and taking total miles both ways to serve the various schools, amounts to about £274,000 discounted over 10 years.

This makes the total cost figure of £413,500 for providing both a non-school and a school bus service after closure (presumably including wear and tear, etc., and drivers' wages in addition to fuel costs) look very suspect indeed. It seems highly likely, therefore, that additional bus costs contained in the cost of closure are considerably higher than stated in the Report.

The cost of transport by road of freight traffic has not been included as a cost of closure of the line. This comprises not only the direct cost, initial capital costs, wages of drivers, fuel inputs, etc., but also social costs of additional wear and tear on roads, congestion and more accidents from heavy lorries, which are especially accident-prone. The carriage of explosives by road to and from Penryndeudraeth seems to create special safety problems, which have been mentioned in the Report but completely ignored in practice.

In spite of all these factors, we will err on the side of caution and use the official figure of additional bus costs avoided as a proxy estimate for total additional costs. They still need to be revised, however, in the light of trends. Bus costs need not necessarily increase to the same extent as the other factors, because there is spare capacity, so they have been arbitrarily increased by 20 per cent on the pessimistic assumption and 30 per cent on the optimistic assumption, to become £497,000 and £538,000 respectively.

The results of all the revisions are shown in Table 3. This shows a substantial net benefit from retaining the line for ten years, even on the pessimistic assumptions. The problem of evaluating intangibles, therefore, does not arise.

For completeness, however, we will consider one of the intangibles quoted in the Report ([7], p. 30), namely, the higher standard of comfort which would be lost if passengers transferred to buses. A very crude proxy variable which could be used to evaluate this is the difference between first and second class rail fares. If we assume that the added comfort of a first class carriage is measured by the difference in railway fares, we may say that the passengers value the comfort at not less than that. We could make the heroic assumption that the difference between the standard of comfort on buses and that of second class rail travel is the same as that between first and second class rail travel. We have evaluated the extra bus costs involved in closing the railway at about £497,000 pessimistically and £538,000 optimistically. If we assume that the total fares charged will be at least equal to these amounts, we can say that these represent the total cost of bus travel to the passengers concerned. We could say that they have lost comfort to at least the extent of some percentage of these values. Typically first class rail fares are about 50 per cent above second class fares,
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TABLE 3

Revised Calculations

<table>
<thead>
<tr>
<th></th>
<th>Discounted Value (at 8%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pessimistic £000</td>
<td>Optimistic £000</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Total costs</td>
<td>1,343</td>
<td>1,164</td>
</tr>
<tr>
<td>(b) Less Costs arising from the use of labour resources with no opportunity cost</td>
<td>684</td>
<td>617</td>
</tr>
<tr>
<td>Total Cost</td>
<td>659</td>
<td>547</td>
</tr>
<tr>
<td>Benefits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. (a) Cost of additional travelling time</td>
<td>61</td>
<td>127</td>
</tr>
<tr>
<td>(b) Cost to children</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. (a) Loss of benefit of journey by rail passengers not transferring in future</td>
<td>39</td>
<td>161</td>
</tr>
<tr>
<td>(b) Resource costs of loss of revenue by public transport operators</td>
<td>235</td>
<td>415</td>
</tr>
<tr>
<td>3. (a) Road costs avoided</td>
<td>90</td>
<td>134</td>
</tr>
<tr>
<td>(b) Cost of accidents</td>
<td>109</td>
<td>180</td>
</tr>
<tr>
<td>4. Additional bus costs avoided</td>
<td>497</td>
<td>538</td>
</tr>
<tr>
<td>Total Benefit</td>
<td>1,033</td>
<td>1,558</td>
</tr>
<tr>
<td>Net Cost of Retention</td>
<td>-374</td>
<td>-1011</td>
</tr>
</tbody>
</table>

so that crudely we could measure the loss of comfort as roughly 50 per cent of the total bus fares paid, which would come to approximately £250,000 and £270,000 respectively. If these values were added to the net benefit of retaining the line they would give values of roughly £624,000 and £1,281,000 net benefit.

CONCLUSIONS

The importance of the Cambrian Coast Line Study lies in the fact that it was intended as a model to be used in further studies by the Department of the Environment of unremunerative rail services. It has been shown that the conclusions of the study are altered, not only by the correction of some figures, but by an updating of the traffic and cost data and, more important, by the rectification of methodological defects.

The magnitude of these various points is illustrated by the fact that, even combining all the pessimistic assumptions, the value of retaining the line may be estimated as somewhere in the region of £624,000. Given a combination of all the optimistic assumptions, the net benefit of retention could be as much as £1,281,000. On strictly social economic criteria, therefore, there seems to be a strong case for retaining the line for 10 years. Indeed, given the order of magnitude of the difference in costs between keeping the line open for 10 years and retaining it indefinitely (at least
£33,000 and at most £232,000, according to the Report), the case for complete retention is also strong. Other factors, such as distributional considerations and the value of other intangibles, if taken into account, would increase the net benefit still further.

REFERENCES


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