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Appraisal in the rail sector: General issues and British experience in dealing with them

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ABSTRACT

This paper first considers the role of appraisal in rail systems, and shows how this extends far beyond simply appraising investment projects to considering long run strategy, renewals, quality of service and closures. It then discusses the particular issues which make rail appraisals complex, including the long life of assets, the complexity of the range of options available, the many dimensions of quality of service, network effects, externalities, the importance of the impacts on other modes and the issue of wider economic impacts. Finally it illustrates these issues with reference to the history of the appraisal of high speed rail in Britain, where key arguments have concerned the robustness of demand forecasts over such long time periods, the valuation of business time savings, the adequacy of the appraisal of alternatives and the extent of wider economic impacts.

1. Introduction

Historically, railways have been seen predominantly as commercial organisations, appraising investment and other decisions on a commercial basis. However, there is a long history of government intervention on investment and on fares and services, so the rail sector formed a natural area for the early application of cost-benefit analysis. In Britain, two of the first such studies were the appraisal of the construction of the Victoria line, a major new investment in the Underground railway in London (Foster & Beesley, 1963) and that of the closure of the Cambrian Coast rural railway in Wales (Ministry of Transport, 1969). Government funded investment and the decision as to whether to pay grants to retain loss making railways both became routine areas for the application of cost-benefit analysis.

However, over the years, railways in much of the world have moved from commercial organisations with some government funding for specific purposes to bodies where government funding plays a major role in their activities as a whole. Moreover, particularly in Europe, there have been reforms to the way railways are managed, with in particular the separation of infrastructure from operations and in most countries infrastructure being managed by a government agency more akin to that responsible for roads (indeed in Sweden the two have been merged into a general transport infrastructure agency). There is also a trend towards franchising services. In Europe, this is mainly regional passenger services; in South America this extends to freight (Nash, 2011).

In this new environment, cost-benefit appraisal plays a much more important role in rail decision taking. Britain is generally considered to be a country that is at the forefront of development of appraisal methods (Mackie & Worsley, 2013) and the rail sector is no exception. The aim of this paper is to outline some of particular characteristics and complexities of rail appraisal, using British experience as an example.

In the next section, we consider the role of appraisal in rail investment and policy. We then discuss some of the particular characteristics of rail appraisals – the long life of assets, the complexity of the range of options involved, the many dimensions of rail quality of service, the importance of network effects, externalities, impacts on other modes and wider economic impacts – which make such appraisals difficult wherever they are undertaken. Finally we illustrate current practice in Britain by tracing the history of appraisal of the new high speed line proposal (HS2).

2. The role of rail appraisal

As noted above, rail systems in much of the world are dependent on governments for their strategy and funding. Rail systems are networks, assets – particularly infrastructure – have very long lives, and infrastructure is increasingly seen as a government responsibility. In Europe, as part of the European Commission policy

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aimed at creating fair terms of competition for new players to enter the market, infrastructure must at least be in a separate organisation from operations and whilst in a few countries (including Germany, Austria and Italy) these are separate subsidiaries of the same holding company, in most they are in a totally separate organisation.

Thus in planning investment (and disinvestment) long term studies of the network as a whole on a social cost-benefit basis are necessary (for instance, the Bahn-Plan 2050 in Switzerland). This in turn sets the scene for more detailed appraisal of specific investments, and for decisions about the level of service to be procured and fares to be set where this is a government responsibility. In Britain, the rail infrastructure company is a not-for-dividend private company, Network Rail, and there planning process starts with long term studies of the market for different segments of the rail industry (long distance passenger, London and South East passenger, regional urban and freight) with a view particularly to understanding future capacity requirements. (Network Rail, 2013b, 2013c, 2013d, 2013e). This in turn feeds into a five year planning cycle, which starts with government determining what it wants from the railway (the High Level Output Statement – HLOS) and what it can afford to pay (the Statement of Funds Available – SOFA) (DfT, 2012). In the light of these, Network Rail prepares a draft Business Plan (Network Rail, 2013a), stating how it proposes to meet these requirements, what investments it will undertake and how these will be funded. The responsibility of the Regulator is then to review these plans, to estimate the funding Network Rail will require provided that it operates efficiently, and to consider how this is to be provided (a combination of track access charges, government grant and borrowing) (ORR, 2013). If the available funding is inadequate, the Regulator needs to seek a solution, ultimately by reducing what the industry is required to achieve if no other way out is forthcoming. Appraisal is used in drawing up the HLOS and SOFA; subsequently all proposed investments must be subject to a full appraisal that is consistent with government appraisal advice (DfT, 2011). Similarly any proposals to abandon sections of route for passenger services are subject to cost-benefit analysis (DfT, 2006), although few such proposals have been published in recent years. Outside this system major projects such as high speed rail may be led by other bodies. In Britain, virtually all rail passenger services are run by private companies under franchises, with the government setting minimum service levels and regulating some fares. This requires further appraisals to consider the implications for benefits and costs of stipulating alternative service levels and fares. Major passenger rolling stock procurement also tends to be led by DfT. Freight services are provided by private companies on a purely commercial basis, although there are grants available to rail freight customers to help pay track access charges in circumstances where there are environmental benefits to traffic going by rail rather than road. At the same time a separate industry owned body (the Rail Safety and Standards Board) determines standards (e.g. signalling systems, level crossings).

Thus we may list the principle roles of appraisal in the rail sector as:

- Long run network studies
- Network modification including closures
- Infrastructure renewal and enhancement
- Franchise specification
- Decisions on policy (e.g. fares regulation) and standards (e.g. safety, overcrowding)
- Specific freight grants
- Passenger rolling stock procurement
- Major projects

Ironically, this is a much longer list than was the case when the government owned the entire rail system outright. In those days cost-benefit analysis was really only applied to investments and to closure decisions, with other decisions being taken by British Rail on a commercial basis, subject to a general requirement to maintain broadly constant levels of passenger service. It is not clear to the author whether cost-benefit analysis is as widely used in examining railway issues in other European countries as in Britain, but given that all European governments heavily subsidise infrastructure and passenger services, it needs to be if governments are to ensure they get best value for money from spending on their rail systems.

3. Characteristics of rail appraisal

In this section we consider some general characteristics of rail systems which make appraisals complex.

3.1. Long life of assets

Railway rolling stock typically has a life of 30–40 years, whilst the life of infrastructure may be measured in centuries. In addition, major new infrastructure, in the form of new lines, may take many years to plan and build, so that even forecasting first year costs and benefits is demanding. In Britain, we now assume a 60 year life in major infrastructure appraisals, and if it takes 10 years to complete the project that means forecasting 70 years ahead. Obviously demand forecasts are crucial, but many other factors determining the level of costs and benefits may change significantly over such timescales. On the cost side, wages, fuel prices and the cost of carbon emissions are significant factors; on demand, changes in the value attached to time savings and other improvements in quality are also important.

3.2. Generation of options

The first major task in any appraisal is to generate a 'do-minimum' scenario, and a range of investment options likely to capture the relevant range of possibilities. For rail schemes, this is particularly challenging. Most rail schemes are enhancing an existing rail network. The obvious 'do minimum' is to leave things as they are, but often this makes no sense. As long lived equipment such as track and signalling wears out, it is often appropriate to consider whether to change the layout and capacity of the system or to adopt new technology. Thus the distinction between renewals and enhancements is often difficult to make. It should not be assumed automatically that all assets should be renewed at their existing quality and capacity; to do so would lead to enormous expenditure not being appraised at all. For instance, of the £8bn spent renewing and upgrading the West Coast Main Line in Britain it has been estimated that three quarters of the expenditure was on renewals. There are always options in terms of the timing, quality and capacity of renewals even if complete closure is ruled out.

Options are typically generated with reference to particular problems it is desired to solve. For instance, growth in demand may require increased capacity. But there is a wide variety of ways of achieving this. Longer trains (or double deck trains where loading gauge permits) are usually the cheapest way, requiring only the purchase of additional rolling stock if the track layout already permits such trains to run. But longer trains may require longer platforms, which may in turn mean changes to the track layout and signalling, whilst double deck trains may require increased gauge for bridges and tunnels. Increasing train frequencies requires not just additional rolling stock but more train crew as well, whilst if there is no spare track capacity, further measures will be needed.