



Occasional Paper Number Two, September 2010:  
**The Benefit, Or Hidden Costs,  
Of Social Cost Benefit Analysis**

### **Introduction**

As we enter the second decade of the century Britain is facing an age of austerity. A new government is being forced by inherited circumstances to impose increased discipline on investment decisions, and transport looks as if it will be at the forefront of this fiscal tightening as the Treasury prepares to release its 2010 Spending Review in October. At the same time, there remains a national consensus that to remain competitive and improve living standards we must, as a nation, maintain our investment in appropriate transport schemes. In this context it is increasingly important to understand and confirm the relative evaluations delivered by Social Cost Benefit Analysis [SCBA], the key method used to inform transport spending decisions.

These issues were raised at one of the ITC's 'Forward Thinking' discussion evenings on 17 June 2010 and have prompted the Commission to undertake its own benefit:cost appraisal on the SCBA. This discussion paper looks at the reasons why SCBA was adopted, how it is currently used, and lays out the areas in which it demands improvement. Moreover, the paper draws on the expertise of ITC members to suggest a twin track approach towards reforming SCBA as an evaluation method. First, in the short term, we identify ways in which

the current methodology could be improved to produce a better grounded evaluation. Second, we recommend a root and branch review of why and how we carry out transport appraisals, in order that we can learn from those approaches used in other sectors and countries.

We note that the House of Commons Transport Select Committee has very recently opened a new enquiry into transport and the economy, and, although this paper was conceived independently, we suggest that its recommendations inform the Committee's discussion. Beyond this, we would like this paper to generate a fresh debate on appraisal methods in transport world, and hope that it will contribute as the starting point rather than the last word in a new effort to encourage better decision making.

I am particularly indebted to Commission members Peter Jones, Greg Marsden, Kris Beuret and Bill Tyson for the contribution they invested in assisting our Secretary, Matthew Niblett, in drawing together this short summary of the issues and our suggested route forward.

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# THE BENEFIT, OR HIDDEN COSTS, OF SOCIAL COST BENEFIT ANALYSIS

## Background

The ITC, the UK's only independent transport commission, held a discussion evening on 17 June. Chaired by Willy Rickett, previously the author of Government's "10 Year Plan" transport development strategy, and hearing from speakers Stephen Glaister, Elizabeth Gilliard and Andrew McNaughton, the group debated the subject "How would you spend £50bn on improving Britain's Infrastructure?". A summary of that discussion is available on the ITC's website entitled 'Rethinking how we spend money on Transport'.

Some significant part of the discussion concentrated on the method of how we appraise and justify major transport spending decisions. Some people argued strongly in favour of the rigour of the existing Social Cost-Benefit Analysis (SCBA) method; while broadly supporting the approach, others seemed to be more sympathetic to adopting a modified version of the system which takes more fully into account the value of reducing CO2 emissions and some modifications to the current treatment of time savings, while some felt that the method was fundamentally flawed. But equally arguments were made that we need a methodology that could be used now. At the end of the discussion, the Chair attempted to assess the mood of the meeting and was surprised that only a modest array of hands were raised in unequivocal support of the current SCBA methodology.

Only two days' before the ITC meeting, the new Secretary of State speaking at a London First event "The Transport Priorities of the New Government" had displayed similar reservations about the rigours of the SCBA method, indicating, in an answer to a question, that he would also wish to see local

issues appropriately taken into account and a requirement to distribute investment around the country as additional criteria for informing transport decisions.

So SCBA has very recently been exposed to greater public scrutiny.

## The need

Where consideration is being given to investing in major transport infrastructure projects, there is a need for a method that will help both to determine whether a scheme offers 'value for money' and is cost effective, and to assist in prioritising among a long list of potential schemes – some very different in nature (e.g. motorway building vs. rail electrification) - given that funds are invariably limited. In the commercial sector these requirements can be achieved through established methods of financial appraisal, but in the case of transport where much investment involves the public sector, the SCBA method has evolved in recognition of the fact that:

- The costs and benefits of both transport investments and operations are not confined to those who provide and use them, but affect non-users and the community as a whole, to a greater degree than almost any other sector of the economy. The clearest examples are noise, congestion and atmospheric pollution.
- The use of the majority of transport infrastructure – the road network – is not allocated by the market in this country, but is provided free at the point of use. This means that the user benefits cannot be assessed directly through willingness

to pay for the service (other than crudely through the fuel duty and Vehicle Excise Duty).

- Even where services are provided by the market and directly priced (e.g. public transport fares), relatively straightforward pricing structures are often used and so provide an imperfect measure of the benefits that users derive from the service.
- Major transport infrastructure is costly and has a long operational life – hence the need for a comprehensive and rigorous appraisal of the investment.

So in light of these considerations, some kind of evaluation method is required.

## The emergence of SCBA

Although the principles of SCBA can be traced back to 19th century welfare economics, the method was first developed and used by the US Army Corps of Engineers to prioritise investment in the irrigation schemes that they were building as part of the New Deal in response to the Great Depression.

It was taken up in this country in the 1960s, where it was applied to transport schemes through a retrospective analysis of the M1 motorway (Beesley) and the Victoria Line (Foster and Beesley). It was then adopted by Ministry of Transport in the 1960s and applied to a number of small projects in the roads programme. Since then it has been applied both to major road and rail schemes, and is formally embodied in the methods required for appraising transport investments in excess of £5m (i.e. as set out in NATA in England and Wales, and STAG in Scotland).

## SCBA today

The basic principles underpinning SCBA have not changed. The core elements of the process are: 1) Specify options; 2) Identify the costs and impacts; 3) Predict the costs and

impacts over the life of the project; 4) Monetise those impacts for which sufficient data and justification exists; 5) Discount the costs and impacts to obtain present values; 6) Conduct sensitivity analysis and 7) Compare the net present value of the alternatives.

Whilst in its early applications SCBA focused almost solely on time savings, vehicle operating costs, fares and accident reduction as the monetised benefits of a scheme, a range of additional measures are now monetised including improvements in journey experiences at interchange and noise. Values for impacts such as agglomeration benefits and other wider economic impacts are being developed as are estimates of air pollution damage costs and climate change emissions. There remain a number of factors that sit outside of the SCBA calculation, but which form part of the overall assessment of the value for money of a project, including impacts on the built and natural environment, water quality and regeneration benefits. These other factors are all presented as part of a wider Appraisal Summary Table under the New Approach to Appraisal (NATA).

In studying the application of this framework to the 1998 road review of 68 trunk road schemes, a study found that the Appraisal Summary Table information appears to have corrected for the traditional in-built bias towards monetised impacts and that the scores for noise, landscape, heritage, reliability and regeneration were “all significant explanators of the decision pattern”.<sup>1</sup>

The project appraisal period for most projects has, in the recent past, been extended to 60 years since the discount rate has been reduced to between 3 and 3.5% from 6%. In addition to this, evidence of a systematic bias in cost underestimation for projects has led to the introduction of an ‘optimism bias’ uplift to projected costs which varies with the nature of the project and the degree of risk mitigation identified, but can be as high as 66% at pre feasibility stage.

1 Nellthorp, J. and Mackie, P. (2000) The UK Roads Review—a hedonic model of decision making, *Transport Policy*, 7, 127-138.

## So what's the problem?

A wide range of concerns have been raised about the present SCBA method, by academics, policy makers, practitioners and interest groups. These can be grouped under five broad headings:

1. Questions concerning how current benefits are valued (e.g. travel time savings, where the same unit rates are used for small and large time savings, and for time savings and time losses);
2. Impacts that are not captured by the current method, such as the severance impacts of road traffic;
3. Forecasts – both of behaviour change and of costs and the monetary value of future benefits – are very difficult to assess and carry large margins of uncertainty that are not fully reflected in the appraisal;
4. The method is not consistent with the setting of objectives and targets, which is how Local Transport plans are produced; and
5. Evidence that political decisions do not mirror the outputs from SCBA (i.e. the benefit/cost ratio).

In relation to (5), the limited evidence base which does exist in Norway, Sweden and the UK suggests that factors other than the benefit/cost ratio are more important in decisions taken by politicians and that the benefit/cost ratios might be more influential as a filter to remove poor projects at an early stage and to appropriately rescope other proposals to achieve a stronger benefit cost ratio.<sup>2</sup>

## The answers?

The UK has a well developed methodology for cost-benefit analysis as part of a broader appraisal method. Considerable skills and expertise exists within government and consultancies which allows the procedures to be applied. The government has invested

heavily in providing guidance on how to develop such proposals. Any change from the current system should be able to demonstrate that it would lead to more effective outcomes – we should not ‘throw out the baby with the bathwater’. Though we note that other countries such as Germany use multi-criteria analysis to rank investment projects and so alternative approaches do exist.

We suggest that the answers lie in a twin-track approach:

- In the short term, make good the major weaknesses within the existing SCBA approach, and
- In the longer term, take a more fundamental look at appraisal: what is it for? In what context is it being applied? What kinds of outputs are most useful and defensible?

## The Short-term

A number of Areas for Attention are recommended:

### The treatment of CO<sub>2</sub> costs

There is a strong debate suggesting the need to include a monetised estimate for carbon dioxide emissions which reflects the long-term costs of climate change. This is one solution to raising the importance of the environment in the decision-making process, but it seems to be very difficult to agree on the current costs of CO<sub>2</sub> emissions, and forecasts of future values vary by a factor of ten or more.

However, as noted above, decision-makers have been shown to be able to include these wider factors without their monetisation. It is not necessarily the case that monetising carbon will lead to decisions which are consistent with achieving our carbon targets. It could remain the case that time savings dominate the appraisal process (as is the case with High

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2 Eliasson, J. and Lundberg, M. (2010) Do cost-benefit analyses influence transport investment decisions, Paper presented at the 11<sup>th</sup> WCTR Conference, Lisbon; Odeck, J. (2010) What determines decision-maker's preferences for road investments? Evidence from the Norwegian Road Sector, *Transport Reviews*, 30(4), 473-494 and Nellthorp, J. and Mackie, P. (2000) The UK Roads Review—a hedonic model of decision making, *Transport Policy*, 7, 127-138.

Speed Rail as well as road projects) and this actually diminishes the importance of carbon in the decision-making process. The existence of targets for carbon dioxide reduction also potentially changes the nature of the investment package proposed. Whilst the government will look for the most cost-effective reduction strategy across all sectors it is likely that transport will be asked to make savings which require the adoption of some carbon reduction policies that do not perform well in benefit/cost terms (a hypothetical example might be speed limit reduction). Here a least-cost rather than benefit/cost approach may be more appropriate.

### **The treatment of time savings**

This is one of the most controversial aspects of existing SCBA applications. Time savings often dominate other benefits, yet there is growing dissatisfaction with the current assumptions that all (non-work) travel time savings have the same unit values. In particular:

- Small time savings may be too small to be perceived by travellers, and have been found to have smaller unit values empirically
- Losing time is valued more highly per unit time than saving time
- Transport schemes where time during travel is used productively (e.g. rail) show smaller benefits from time savings, so investment goes into enhancing the less the productive modes.

Wider concerns have also been expressed. Two issues in particular stand out. First, that time savings are only short-run gains since daily travel time budgets have not reduced in response to the cumulative improvements to the UK transport system over time (Metz). Second, the measured wider economic benefits are much less than the time savings which are regarded as proxy values for the former (Wenban-Smith).

Enough data exist to begin to explore the implications of changing the treatment of time savings within the existing SCBA.

### **Distributional issues**

The costs and benefits of schemes vary both spatially and socially – something which has been paid very little explicit attention in SCBA methods. The benefit/cost ratio provides a net estimate of all costs and benefits combined, and do not highlight the groups or areas that gain or lose from a proposed scheme. For example, the areas which benefit from time savings may well be different from those which suffer increased noise or air pollution resulting, say, from the construction of a town by-pass, or a high speed rail line.

There is considerable experience of mapping impacts in geography and elsewhere that could be formally incorporated into SCBA, showing how social groups and areas are impacted in different ways.

### **Dealing with contraction**

Does benefit/cost work in the same way for projects aimed at infrastructure contraction as it does for expansion? Clearly, the calculation should be different - the cost is not one of construction and operation but of savings in operation and the cost of decommissioning the kit.

As Spending Departments are required, in the Spending Review, to analyse what they do, what they do not need to do, what they could do better, then perhaps it is necessary to consider whether the use of the SCBA approach could usefully contribute to such debates.

When the last significant railway closures ignited under the direction and enthusiasm of Dr Beeching, the basis on which each line was closed was based on its immediate individual financial viability. No account was taken of the effect of closure on the totality of the railway, nor of the economic or social impacts (CO<sub>2</sub> or other) of closure; nor were routes safeguarded for potential future transport requirements. We might usefully avoid this narrow, accountancy-based analysis in the current climate.

## **Un-monetised impacts**

Transport schemes have significant impacts which are not monetised, as described above. A comprehensive review of these is needed, with the flexibility to add more as needs and values change over time. This review should, therefore, include a structure for taking account of non-monetised benefits and disbenefits in the decision making framework.

## **Decision making: SCBA's role**

Where does SCBA sit in the decision making system? A scheme which goes through the 'option appraisal to npv' process described above could still be pointless if it works against other schemes taking place (e.g. a public transport system to reduce car use alongside a road widening – as happened in several cases in the 1980s and 1990s); or if it doesn't contribute to the town / regional / national objectives; or if it suffers widespread opposition and protests, even closure, because of failures of consultation.

## **The longer term**

Track two would involve taking a much more fundamental look at appraisal, in two respects. First, by looking afresh at why appraisals are needed and what purposes they serve – in the context of the tasks carried out by, and statutory duties placed on, different bodies (e.g. local highway authorities, Integrated Transport Authorities, the Highways Agency).

Secondly, by looking at how appraisal is carried out on different sectors and in different countries. For example, cost-effectiveness is more widely practised in some sectors (e.g. where there are firm standards or targets that have to be met), and some countries prefer a multi-criteria approach to a benefit/cost approach.

It is always problematic to carry out a fundamental review of this nature, because of the uncertainties and implications for schemes in the pipeline or at public enquiry. But, in this respect

the current economic cloud has a silver lining, in that the current near moratorium on progressing major new transport schemes presents a once-in-a-lifetime opportunity to carry out such a fundamental review without prejudicing major transport investment programmes.

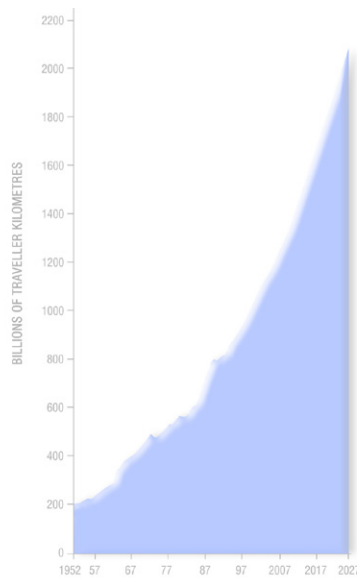
## **The proposition**

The Commission provides an independent assessment of the transport issues of today. Based on the lively debate at our discussion evening, and parallel debates in the technical press, it is evident that there is a broadly based unease as to the fitness-for-purpose of current appraisal methods. This concern needs to be addressed as a matter of urgency, and the current restraints on developing major new transport schemes provide an ideal breathing space to do so. We will also have to take into account various developments including the impacts of an ageing population, advances in technology (in transport as well as in other forms of communication) and the increasing globalisation of business and society. All will have major impacts on requirements placed on our transport systems.

Taking a pragmatic view, we recommend a two-track approach:

1. Patches and quick fixes: adding into the existing framework updates that are doable within a short time frame and meet some major concerns. These are likely to include revisions to the treatment of time savings, better incorporation of CO<sub>2</sub> impacts, and an explicit requirement for SCBA to be within a decision making framework and not the entire argument.
2. A root and branch review: a fundamental reassessment of what why we carry out appraisals and what we could learn from the approaches used in other sectors and countries.

Finally, we must remember that we cannot repair the nation's infrastructure development because of an extensive debate over how to evaluate it.



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