Economic Appraisal of Active Travel Schemes

Practice and Guidance in the UK

Philipp Thiessen and Robin Cambery
Appraisal
The Five-Case Business Case

- **Strategic**
  - Is there a good case for change?

- **Management**
  - Is it achievable?

- **Financial**
  - Is it affordable?

- **Commercial**
  - Is it commercially viable?

- **Economic**
  - Is it value for money?
The Treasury’s Green Book sets out the way Government undertakes appraisal and evaluation.

This sets out the basis of cost-benefit analysis, comparing the benefits to society against spend from the transport budget.

This approach is welfare-based, looking at benefits experienced across society, not just individual impacts such as economic growth.

The Green Book also changes to keep analysis up-to-date, e.g. ecosystem services.
WebTAG appraisal guidance

- WebTAG works with the Green Book framework to provide advice on how to produce transport appraisals.
- This is a full account of how to provide evidence of all impacts brought about by transport intervention.
- The guidance should be applied proportionately.
- It is also updated periodically to keep the evidence base and best practice advice as up-to-date as possible.
- Not just for practitioners: introductory guidance is available in the same place.
The economic case

The Economic Case

Environment
- Greenhouse gas emissions
- Air quality
- Noise
- Water environment
- Landscape
- Townscape
- Historic environment
- Biodiversity

Economy
- Wider impacts
- Cost savings
- Reliability
- Regeneration

Social
- Health
- Accident risk
- Accessibility
- Security
- Personal affordability
- Option values
- Journey quality
Important impacts for active modes

- Health Impacts (mortality and morbidity)
- Absenteeism (sick days)
- Journey quality: the journey experience, crowding and safety
- Highway accidents (involving cyclists and/or motorists)
- Environmental externalities:
  - Air quality
  - Noise
  - Greenhouse Gases
- Decongestion (time savings)
- Indirect tax (fuel duty to the Treasury)
Physical activity impacts

Background evidence

- Uses the same methods as the HEAT tool (Health Economic Assessment Tool)
- Inducing frequent cycling (36 mins/day) reduces the relative risk of all-cause mortality to 72% of an ‘average’ person aged 15-64 (Copenhagen Heart Study)
- Assume a linear dose effect for those cycling more or less (rather than a threshold)
- Walking assumes an 85% relative risk for the same time spent
- Assumed health benefits build up over (3) years to enjoy full benefits
Physical activity impacts

Calculation

- Forecast new active mode users over time
- Calculate the change in relative risk due to total level of activity
- Calculate the number of lives saved from incidence of death in the population
- Multiply through by the economic value of prevention of a fatality (£1.2m in 2002 prices)
- Calculate for appraisal period (nominate that period and apply discounting)
Physical activity impacts

Challenges and developments

- More evidence is required to ascertain how long it takes to accrue maximum benefits.
- More evidence required to determine decay rate (universal to all appraisal objectives) and appropriate appraisal period.
- Mortality data is for 15-64 year olds, so shouldn’t apply to children – some evidence that activity in childhood can track into adulthood and tackle childhood obesity.
- Morbidity impacts are not yet in the guidance, although research has shown that an appropriate benchmark may be around 40% of mortality benefits, so there is a further chunk of benefits to include.
Moving Britain Ahead

Absenteeism

- More active people take less sick days
- This benefit accrues to businesses where staff are more productive due to fewer days of absence
- TfL study showed that regular activity through commuting by active mode reduces sick leave by 6%
- Works out around £60 for cyclists and £32 per walker per annum
Journey Quality: Cycling

- WebTAG databook shows values users place on different types of infrastructure
- Need to reflect on the part of the average trip is made on the route and the counterfactual

0 pence

3 pence

7 pence
Journey Quality: Walking

- WebTAG databook shows values users place on different types of infrastructure
Accidents

- More accidents occur where the accident rate for active mode users, or the severity of incident, is greater.
- Fewer accidents will occur where less traffic is on the road (most data is on accidents involving motorists).
- A study shows that doubling in the number of cyclists on the road only increases the number of accidents by 32% and thus, decreases the accident rate.
- Determine the cost of accidents, through using the value of life and additional costs that accrue through emergency services.
Decongestion

- Drives most of the benefits that accrue where mode shift occurs from private vehicles to other modes.
- Marginal external costs of congestion are reduced, allowing time savings for motorists and reduction of other externalities such as noise and air pollution.
- Uses values from the National Transport Model, segmented by area types.
- Can calculate carbon emission savings using DECC values.
- Also includes reduced fuel duty received by the Treasury (Indirect tax).
Forecasting

- Crucially important, since usage drives the benefits
- Attempt to forecast the impact of an intervention and have an accurate assessment of the counter-factual (all modes)
- The evidence base is growing through more evaluation evidence, but it is challenging
- Comparative study and benchmarking impacts is often a proportionate approach
- To what extent will the impact of the intervention decay over time?
- How long should we appraise these schemes for?
Further Information - WebTAG

- WebTAG Unit A5.1 – Active Mode Appraisal
- Unit A3 – Environmental Impact Appraisal
- Unit A4.1 – Social Impact Appraisal
- Unit A1.1 – Cost Benefit Analysis

Higher level units, such as “The Transport Appraisal Process” technical project manager unit, explains the principles and process of appraisal in more detail.
For Practitioners…
Overview

- Introduction
- Existing Evidence base
- Work in Progress
- ‘BCR ingredients’
- The ‘BCR machine’
- ‘Insider Knowledge’
- Make you own BCR – hands on session
Introduction
Introduction

- Cycling Delivery Plan targets
- Cycling and Walking Investment Strategy (Infrastructure Bill amendment)
- Devolution (Local Growth Fund)
- All will rely on strong business cases made locally
- Today we will focus on active mode appraisal as this is most straight forward. For more complex LSTF type programmes, more complex economic cases required…
Introduction: five case business case

- Achievable – can be successfully delivered
- Affordable – within the budget
- Applicable – a strategic fit
- Appropriate – optimum Public Value
- Attractive – to supply side and feasible

- Introduction
- Existing Evidence base
- Work in Progress
- ‘BCR ingredients’
- The ‘BCR machine’
- ‘Insider Knowledge’
- Make your own BCR – hands on session
Existing Evidence base
Recently Published material

As on reading list…

- Published in November (CDP consultation)
  - Claiming the Health Dividend
  - Value for Money analysis of the large LSTF schemes
  - Value for Money analysis of the cycling grants

- Published in March (CDP consultation response)
  - LSTF employment impacts
  - Cycling and Walking – The economic case for action
    - The economic case for action – toolkit
  - Finding the Optimum: Revenue / Capital Investment Balance for Sustainable Travel
**Summary of the Economic case (BCRS)**

<table>
<thead>
<tr>
<th>Typical BCR’s from these studies</th>
<th>Ratio</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Travel Towns</td>
<td>4.5:1</td>
<td>Decongestion benefits only</td>
</tr>
<tr>
<td>Cycling Demonstration Towns</td>
<td>2.59:1</td>
<td>Health benefits only</td>
</tr>
<tr>
<td>Local Sustainable Transport Fund</td>
<td>5.1:1</td>
<td>Based on 12 large schemes business cases</td>
</tr>
<tr>
<td>Cycling Ambition Grants</td>
<td>5.5:1</td>
<td>Based on business cases for 12 funded schemes</td>
</tr>
<tr>
<td>Linking Communities Fund</td>
<td>10:1</td>
<td>Based on eight representative schemes</td>
</tr>
<tr>
<td>Literature Review</td>
<td>5.6:1</td>
<td>Average BCR for UK case studies, overall average 6.3:1</td>
</tr>
<tr>
<td>Transport for London Cycling Vision</td>
<td>2.9:1</td>
<td>Very large programme - conservative BCR</td>
</tr>
</tbody>
</table>
Employment impacts part of the strategic case

Impacts not additional to those covered in the BCR – the economic case

But can be a useful additional dimension for presenting a scheme where in competition with other ‘local growth’ proposals

Paper demonstrates a methodology that should be relatively easy to apply to derive direct, supply chain and induced employment from public spending.
Optimal Revenue / Capital Investment Balance for Sustainable Travel

- Review of a large number case studies and existing evidence
- Main results: different ratio required in different circumstances
- Overall no optimal balance – but extremes are suboptimal
- There is some evidence for an inverse U relationship
- Optimal changes over time – e.g. build infrastructure first, then advertise it, then build more.
Work in Progress
Revisiting Sustainable Travel Towns

- Understanding how travel behaviour and habits have developed over the period following the initial investment (informing the ‘decay’ of benefits)
- Research currently underway, to be published later this year.

Social and Economic impacts of Cycling

- Topics include ‘where do new cycling trips come from’ (the ‘mode shift’), impact of cycling on the high street etc. (the ‘local growth impact’)
- Evidence reviews and recommendations for evaluation frameworks underway
Propensity to cycle

- Micro-simulation model of the English Population
- Will allow policy makers to test where the largest cycling potential lies
- Should focus investment on areas with the largest ‘quick wins’
- Allows achieving cycling targets in cost effective way
- Will provide heat-maps of where the latent demand is largest

LSTF – annual reports and meta-analysis

- A wealth of case studies and success stories are already coming out from the LSTF annual reports
- Meta analysis of the interim reports from 12 large schemes is underway, soon to be published
Databank of case studies

- Both DfT and TfL have identified the benefit of sharing best practice and publishing existing evidence from previous scheme evaluations and making them available in ‘one-stop-shop’.

- This is likely to be coming out later in the year.
BCR ingredients
The standard transport appraisal covers up to 24 sub-objectives.

Depending on the scheme nature, transport models of varying complexity are required.

In general there is no one size fits all
1st Ingredient: Current use

- The more people make use of a scheme, the better.
- A ‘wider audience’ will mostly give ‘more bang for your buck’.
- Current use data can come from:
  - Local Survey
  - Automatic/Manual counts
  - NTS, Census
  - Active People Survey
- E.g. starting from Census data:
  - Imagine you plan a cycling route...
1st Ingredient: Current use

- The more people make use of a scheme, the better.
- A ‘wider audience’ will mostly give ‘more bang for your buck’.
- Current use data can come from
  - Local Survey
  - Automatic/Manual counts
  - NTS, Census
  - Active People Survey
- E.g. starting from Census data:
  - Person Living at A…
1st Ingredient: Current use

- The more people make use of a scheme, the better.
- A ‘wider audience’ will mostly give ‘more bang for your buck’.
- Current use data can come from
  - Local Survey
  - Automatic/Manual counts
  - Or derived from combination of sources – e.g.:
- Starting from from Census data:
  - Person Living at A and working at B will not use your route…
1st Ingredient: Current use

- The more people make use of a scheme, the better.
- A ‘wider audience’ will mostly give ‘more bang for your buck’.
- Current use data can come from
  - Local Survey
  - Automatic/Manual counts
  - Or derived from combination of sources – e.g.:
- Starting from from Census data:
  - Person Living at A and working at C is likely to use part of your route for part of their journey…

That estimate for commuting use can then be extended based on e.g. NTS data to all purpose usage… Repeat for entire route length!
Another factor of success is how many additional users might be encouraged to take up walking/cycling as result of the scheme.

Encouraging more physical activity in the population can have significant health benefits, not least future NHS savings!

Several ways for forecasting future use in WebTAG – most popular:

- Evidence from existing study

Need to consider transferability

Example: Cycling Demonstration towns, Sustainable Demonstration towns and Cycling Cities and Towns all show ~+25-30%
Journey Quality: Cycling

WebTAG databook shows values users place on different types of infrastructure

0 pence

3 pence

7 pence

3 pence

Need to reflect on the part of the average trip is made on the route and the counterfactual.
3rd Ingredient: Quality Valuation

WebTAG databook shows values users place on different types of infrastructure
Other Ingredients:

- Introduction
- Existing Evidence base
- Work in Progress
- ‘BCR ingredients’
- The ‘BCR machine’
- ‘Insider Knowledge’
- Make you own BCR – hands on session

Making the case for active travel
The ‘BCR Machine’
Please answer the following questions with your best estimates to obtain a benefit cost ratio of your scheme. By varying your answers you can test the importance of the input data on the overall value for money of your scheme. The answers provided are for the example case study from Appendix B of WebTAG unit A5.1. This case study provides further helpful commentary that users of this tool might want to refer to.

### Scheme details
- **When would the scheme be likely to open?** 2012
- **What is the last year of initial funding?** 2012
- **Decay rate (starting from last year of funding)** 10.0%

WebTAG A5.1 explains - the impacts especially of revenue funded initiatives such as cycle training or personalised travel planning are likely to diminish year by year following the investment. For the case study here this is likely to be conservative.

**Appraisal period (should be the expected asset life, maximum 60)** 20 yrs

### Costs
Please provide estimates for upfront costs as well as future maintenance costs in the table below. Please enter the full costs of the scheme in the first column and any private sector contribution to those costs in the second. All other funds are assumed to be from local or central Government.

Please use a constant price base and specify the year here.

Do refer to WebTAG unit A1.2 to set Optimism Bias 15%

<table>
<thead>
<tr>
<th>Year</th>
<th>Total scheme costs '000€</th>
<th>3rd party contributions '000€</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>201</td>
<td>19</td>
</tr>
<tr>
<td>2010</td>
<td>201</td>
<td>19</td>
</tr>
<tr>
<td>2011</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2012</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2013</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2014</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2015</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2016</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2017</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2018</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2019</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2020</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2021</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2022</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

### Do Nothing scenario
This is what is most likely to happen if the scheme is not implemented. The data could for example be from automatic or manual traffic counts.

- **Number of cycling journeys** 1,090 per day, average length 3.9 km and speed 20 kph
- **Number of walking journey** 522 per day, average length 1.15 km and speed 5 kph

Ideally the data is taken from ‘average weekday’ in spring or autumn to avoid seasonal bias.

A return trip involves two journeys and would need to be counted as such.

To identify how many individual users this implies, please estimate the share of journeys that form part of a return trip here: 90%

### Do Something scenario
Once your scheme has reached its full impact (ignoring any initial build up here), how would these figures have changed (due to the intervention)?

- **Number of cycling journeys** 1,638 per day, e.g. from automatic or manual cycle count.
- **Number of walking journey** 572 per day

For simplicity it is assumed that the length and speed of journeys is largely unaffected by the intervention.
### Journey Quality Impacts

WebTAG units A5.1 and A4.1 provides guidance, the Databook provides suggested values that users might place on the improved infrastructure your scheme provides. The values are shown in the WebTAG journey quality tab. The improvement over the 'do nothing' scenario should be valued, rather than the absolute level.

- **For cyclists**
  - 1.76 pence per minute
  - 0 pence per trip (e.g. shower facilities)

- **For pedestrians**
  - 2.61 pence per km

As demonstrated in the case study, these values should take account of the proportion of the average journey that would be made on the improved infrastructure.

### Decongestion benefits

What proportion of new users would most likely be using a car in the do nothing scenario?

- **for cyclists**
  - 27.3%

- **for pedestrians**
  - 27.3%

Which area type from the drop down is most similar to the area your scheme is located in?

- London

### Additional information

**Background Growth**

If you have an estimate of the growth in background use (in both scenarios), please set

- the annual growth rate: 0.25%
- the period over which this applies: 20 years

Number of days in the year that you would expect the above usage figures: 220 days p.a.

In the case study this is assumed to the typical number of working days - but might more appropriately be set to the number of weekdays.
‘Insider Knowledge’
Some tips and hints – The Narrative

- Tell the story
  - What are the local issues and problems
  - Why and how is your scheme solving this?
  - What does it look/feel like, what are we buying with the funding?
- Don’t assume we know anything about your scheme
- Don’t underplay the Strategic case
Some tips and hints – Transparency

- Tell the story behind the economic case:
  - Data Sources
  - Assumptions and Evidence base
  - Sensitivity tests
- Be open on limitations and missing data or evidence
- Submit workings and spreadsheets, show benefits by driver and link back to strategic case – how does your scheme cause this impact?
- If we get a simple ‘My BCR is 100’ without supporting evidence or explanation, all we can do is reject
- Extremely frustrating having to reject the most wonderful schemes because of some details missing.
- If anyone knows, its you, so tell us!
More tips: read the question…

- Especially in competitive funding allocations…
  - We are trying to minimise work for you and ourselves when we
    - Ask for specific data
    - Ask you to fill in an Excel form
    - Ask for an economic appraisal or evidence report
  - We do that in order to avoid unnecessary/expensive work for you!

- So please
  - Don’t submit the PDF version of the Excel form
  - Try not to add rows or columns
  - Make it obvious where you answer the questions
  - Clearly point us to the supporting evidence

- Return the favour and make it easier for us to fund your scheme!
  - Really frustrating to only find that hidden appendix when it’s too late!
DIY - Hand on session
Make your own BCR

- Have a go and ask us any question arising!
- Wireless Network: TransIT
- Password: @mia212@

- The toolkit is available on https://www.gov.uk/government/publications/cycling-and-walking-the-economic-case-for-action
Any other Questions?

- Do not hesitate to contact us

Philipp.Thiessen@DfT.gsi.gov.uk

Christopher.Page@DfT.gsi.gov.uk