HEATCO

Developing Harmonised European Approaches for Transport Costing and Project Assessment

SIXTH FRAMEWORK PROGRAMME 2002 – 2006

Main principles for harmonised guidelines for infrastructure project appraisal

1 Why HEATCO?

As the world economy is rapidly adapting to globalisation, Europe notices how more and more problems get more international. Infrastructure is one of them. Especially in the new EU member states, there is an obvious need for infrastructure catch up. But as well in existing member states rapid rise in mobility renders infrastructure problems more urgent, and transport projects more border-crossing. How should one evaluate projects where two or more countries are involved? How to deal with countries applying for EU funds to create new transport projects? In some member states consistent methods hardly exist even on the national level. HEATCO aims at harmonising European transport project appraisal by supplying a unified framework. The project partners aim to develop project appraisal guidelines based on the criteria economic efficiency, transparency and support from policy makers in member states. All of these criteria are vital to the success of harmonised guidelines. Input from member states is, therefore, very important[2].

In a first step the project assessment practice in the EU member states was reviewed and analysed. In a first workshop, on 14 April 2005, the findings were presented to and discussed with stakeholders from a number of member states. Based on this, currently a proposal for harmonised guidelines for infrastructure project appraisal is being prepared, taking into account the theoretical and empirical state-of-the-art. This document gives an overview of the main principles which the HEATCO consortium intends to recommend for harmonised guidelines for infrastructure project appraisal on EU-level. The intention of the document is to inform about these central principles and to give the opportunity to comment the suggestions at an early stage. We would appreciate very much your feedback.

2 General issues

In carrying out a CBA we recommend the following 12 general principles:

1. Decision criteria. We recommend the use of NPV (net present value), BCR (benefit cost ratio) and RNPSS (ratio of NPV and public sector support) decision rules in CBA

[2] Information on the HEATCO project can be found at http*://heatco.ier.uni-stuttgart.de*

applications. The use of the first year rate of return (FYRR) decision rule should be used to determine the optimal opening year of a project.

2. Treatment of non-monetised impacts. We recommend, at a minimum, that where impacts cannot be expressed in monetary terms they should be presented in qualitative or quantitative terms alongside evidence on the monetised impacts. Where there are a small number of non-monetised impacts, sensitivity analysis may be used to indicate their potential importance. Alternatively, when there are a large number of non-monetised impacts, and the decision-maker requests an explicit weighting of impacts and ranking of projects, multi-criteria analysis should be used. .
3. The project appraisal evaluation period. We recommend the use of a 40 year appraisal evaluation period for TEN-T projects. When potential projects are compared, a common final year should be used that is determined by adding 40 years to the opening year of the last project to be started.
4. Treatment of future risk and uncertainty. For uncertainty (non-probabilistic) analysis, we recommend sensitivity analysis or scenario analysis, as appropriate. If resources and data are available for probabilistic analysis, Monte Carlo random selection simulation analysis can be undertaken.
5. Discounting. To reflect rates existing in EU countries, a common discount rate of 3% should be utilised. Where the countries impacted by a specific project currently utilise declining discount rate regimes in other areas of national project or policy appraisal, these should be utilised..
6. Intra-generational equity issues. We recommend, at minimum, that a "winners and losers" table should be constructed, and presented alongside the results of the monetised CBA. Distributional matrices for alternative projects might be constructed and compared and stakeholder analyses should also be undertaken. Local values for unit benefit and cost measures should be used.
7. Non-market valuation techniques. When impacts in transport project appraisal are not expressed in a market price, but are potentially significant in the overall appraisal, we recommend that the choice of technique used to value individual impacts should be dictated by the impact type and the nature of the project but that WTP measures are preferable to cost-based measures. Values should be validated against existing European estimates.
8. Value Transfer. Value transfer involves the use of economic impact estimates from previous studies to value similar impacts in the present appraisal context. Value transfer can be used when insufficient resources for new primary studies are available. The decision as to whether to use unit transfer with income adjustments, value function transfer and/or meta-analysis will depend on the availability of existing values and experience to date with value transfer related to the impact in question.
9. Treatment of indirect socio-economic effects. We recommend that where indirect effects are likely to be significant, an economic model, preferably a Spatially Computable General Equilibrium (SCGE) model, should be used. If indirect effects cannot be modelled due to high costs (of the use of advanced modelling), insufficient availability of data, lack of appropriate quantitative models or unreliable results, qualitative assessment is the alternative.
10. Marginal Cost of Public Funds. Our recommendation is to assume a marginal cost of public funds of 1, i.e. not to use any additional cost (shadow price) for public funds.

11. Producer Surplus of Transport Providers. We recommend to estimate (changes in) the producer surplus in the context of changed traffic volumes, and of the introduction and adjustment of transport pricing regimes, where data projections allow.

3 Value of time and congestion

It is recommended that different valuation methodologies are used for three broad categories of trips (passenger-work, passenger-non-work and commercial goods traffic). We recommend the minimum acceptable methodology for commercial goods traffic and passengers travelling for work (business trips) should be the cost saving approach. More sophisticated approaches[3] are also clearly acceptable. With respect to values for passengers during non-working time (including commuting) we would recommend a valuation methodology based on willingness-to-pay.

At the minimum travel time savings values should distinguish between passenger-work trips, passenger-non-work trips and commercial goods traffic by mode. However, more sophisticated appraisals should disaggregate these categories further (e.g. for passenger trips by disaggregating by mode, income, journey purpose, journey length, etc.).

It is recommended that where possible the effects of congestion (above and beyond travel time delays) are taken account of within an appraisal. The ability to reflect the impacts of congestion in an appraisal, however, will depend on the sophistication of the traffic and transport modelling.

It is recommended that the same unit value (i.e. per hour, per minute, per second) should be applied irrespective of the size or sign of the time saving. Unless local data suggests otherwise we would recommend that the value of travel time savings should increase over time with an elasticity of 0.8 with respect to GDP/capita for the three categories of trip.

4 Value of changes in accident risks

For reasons of transparency and accuracy it is preferable to estimate and value clearly defined endpoints and the associated risks. In the case of accidents these are fatalities, serious injuries, slight injuries, and material damages (instead of "average accidents"). We recommend using the most common accident definition:

- Fatality: death within 30 days for causes arising out of the accident.
- Serious injury: casualties who require hospital treatment and have lasting injuries, but who do not die within the recording period for a fatality.
- Slight injury: casualties whose injuries do not require hospital treatment or, if they do, the effect of the injury quickly subsides.
- Damage-only accident: accident without casualties.

Accident risks should be estimated using national or local data on accident rates and trends. Changes in infrastructure types and transport mode shares should be taken into account as far as possible when estimating the quantitative change in number and severity of accidents and casualties. Where relevant (mainly in road transport), estimated accident risks should be

[3] Such as the Hensher approach for business trips and the willingness-to-pay approach for commercial goods traffic.

corrected for underreporting in official accident statistics. Changes in accident risk are valued on the basis of expenditures (for medical and rehabilitation cost, legal cost, emergency services and property damage costs), net lost production value and value of safety per se (willingness to pay for risk reduction).

5 Environmental costs

The leading principle for quantification of environmental costs should be the valuation of damages (e.g. additional respiratory hospital admissions) instead of pressures or effects (e.g. emissions of fine particles). The monetary valuation of concrete endpoints (e.g. hospital admissions) is more reliable and transparent than deriving general cost values, e.g. the willingness-to-pay for reducing air pollution. Furthermore the variation of costs with site of emission and vehicle characteristics should be reflected adequately. As a consequence we generally recommend to value environmental costs based on the so-called Impact Pathway Approach.

5.1 Noise

We recommend to base the assessment on the number of people exposed to certain noise levels. Based on this, annoyance effects and health impacts can be calculated and valued monetarily, resulting in monetary values per person exposed per dB(A) for different noise levels.

5.2 Air pollution

We recommend derivation of monetary values per kg of pollutant emitted based on the Impact Pathway Approach. These should include at least health impacts on both the local scale and due to transboundary pollutant dispersion. Minimum disaggregation level for the resulting damage factors should be urban / extra-urban location of the emission source.

5.3 Global warming

Due to the global scale of the damage caused, there is no difference how and where the emissions take place. As uncertainties involved in estimating damage costs in this area are very high we recommend using abatement costs per tonne of CO_2 emitted. The underlying reduction targets should be socially accepted, as is the case for the Kyoto reduction targets for instance.

5.4 Other factors

Environmental impacts such as vibration, severance, visual intrusion, loss of important sites, impairment of landscape, as well as soil and water pollution are difficult to include based on general values, because the impacts are very site specific (e.g. impairment of landscape). Usually such aspects are covered by the requirements for Environmental Impact Assessment, and contain obligations to meet certain target values. However, even if such standards are met, the remaining burdens lead to external costs, which should be considered. Where monetisation is not (yet) possible, these effects should be considered beside the CBA.

6 Costs and indirect impacts of infrastructure investment

A large proportion of the engineering and construction costs will be taken account of by the initial capital outlay compared to the expenditure related to operating the investment over the

appraisal period. In a CBA a whole life costing framework should be used as explained below.

6.1 Capital costs

We recommend using the following definition of capital costs:

- *construction costs*, including materials, labour, energy, preparation, professional fees and contingencies;
- *planning costs*, including design cost, planning authority resources and other costs incurred after the decision to go ahead;
- *land and property costs*, including the value of the land needed for the scheme (and any associated properties), compensation payment necessary under national laws and the related transactions and legal costs;
- *disruption costs*, i.e. the disruption to existing users to be estimated using the same values of time as are used for travel time savings arising from the scheme.

The assessment of capital costs should be based on two general principles. First, costs should be attributed to the project year in which the resources become unavailable to alternative uses. Second, non-retrievable (sunk) costs incurred prior to the decision should not be included in the cost-benefit analysis.

6.2 Costs for maintenance, operation and administration

Costs for maintenance, operation and administration are costs accrued during the operating life of transport infrastructure by the infrastructure owner for the parts of the network which are changed by the project. The costs can be grouped into two main categories; non-traffic related costs and traffic related costs. If no national default values are available, costs figures can be derived from national accounts/statistics on the basis of a suggested split of cost categories into fixed and variable costs.

6.3 Changes in infrastructure costs on existing network

Changes in infrastructure costs on the existing network are costs accrued during the operating life of transport infrastructure by the infrastructure owner for the parts of the network which are *not* changed by the project. Non-traffic related costs are by definition unchanged for the existing network. If no national standard marginal costs figures are available for marginal costs, these can be approximated by average variable costs (see section 6.2)

6.4 Residual value of the infrastructure

The evaluation period is often limited to the period over which transport demand can be foreseen with reasonable accuracy, which is often shorter than the lifetime of the infrastructure. This introduces the issue of residual value of the infrastructure, which is an item in the appraisal which captures net benefits beyond the formal evaluation period.

We recommend using a pragmatic approach for estimating the residual value, which includes determining the fixed lifetime of the infrastructure (or its sub-components) and using a linear depreciation profile. For short-lived sub-components reinvestments may be necessary during the evaluation period.

6.5 Optimism bias

Optimism-bias is the tendency of appraisers to underestimate costs. The causes and cures to optimism-bias are many of which only a few are related to guidelines to project appraisal.

We recommend that a side analysis is conducted showing the results of the cost-benefit analysis when estimated costs are adjusted using standard optimism bias uplifts. Furthermore, the cost estimates used for the appraisal should be benchmarked against realised costs of similar projects.