Valuing the wider benefits of road maintenance funding

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Abstract

A model has been developed to improve the evidence for valuing the full benefits of highways maintenance spending on local roads in England. It predicts the quantifiable impacts of levels of road maintenance. It is recognised that there are constraints, due to existing knowledge, with regard to how far some impacts may be quantified. The main drivers for the model was to get a greater understanding of the wider societal impacts in maintenance appraisal, such as vehicle operating costs and user time savings. The model is based around an existing carriageway condition prediction model developed for HMEP. The framework of the model provides the logical design for the various analyses that are undertaken within the model. The analyses are grouped into various modules with each module focussing on a particular function of the model. Following completion of the model, demonstration scenarios were tested to assess the types of analyses that could be run. The analyses allowed different questions to be investigated and hence show the types of ‘what if’ scenarios the model can support when analysing user and other impacts of maintenance. The national level analyses for England (excluding London) using the new tool reinforce and indeed strengthen these earlier conclusions that investing in local highways maintenance can present high to very high value for money.

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1. Introduction

This study set out to improve the evidence base for valuing the benefits of highways maintenance spending on local roads in England (excluding London). Studies for roads in Scotland, by Transport Scotland (Parkman et al. 2012), and local roads in England, by the RAC Foundation with the Association of Directors of Environment,
Economy, Planning and Transport (ADEPT) (Gould, Parkman and Buckland 2013), have recognised that the impacts of maintenance funding levels reaches beyond the direct works costs and the costs of disruption to road users. The purpose of the study was to demonstrate how the condition of the local road network evolves over time under different spending trajectories and how this impacts both maintenance costs and wider costs to society.

The resulting model predicts the quantifiable impacts of levels of road maintenance. It is recognised that there are constraints, due to existing knowledge, with regard to how far some impacts may be quantified. Within the current study, the aim has been to identify all quantifiable impacts, whilst acknowledging that some impacts can only be described qualitatively, resulting in the following relationships and impacts being covered:

- Carriageway condition, traffic growth and vehicle speed, to derive user time and vehicle operating cost impacts.
- Maintenance treatments to derive the embodied carbon, user time and accident impacts related to roadworks. Direct job impacts are also considered.
- Allocated budgets, to derive the accident impacts (not related to roadworks).

2. Modelling concept

The model was developed against three key principles.

Firstly, The model must work with data that is available now. The quality of data varies across different networks and assets and the availability of data also tends to vary depending on the road type or hierarchy. The intention has been to ensure that the model works with existing data and allows for future refinement and enhancement as more or improved data becomes available.

Secondly, it is understood that not all effects can be quantified. This should be made clear for users of the model. It is also considered reasonable to assume, given that the focus of the study has been on marginal changes to funding, that the dominant effects will be due to changes in carriageway conditions.

Finally, the model needs to be flexible and easy for use by a range of users. The intention is that the model will be used by both DfT for national analyses, and across the range of Local Authorities. It should allow for this range of users and be relatively simple and flexible. For these reasons a spreadsheet approach was adopted.

2.1. Appraisal in the UK

The model has been designed in accordance with the latest DfT Transport Appraisal Guidance (WebTAG (DfT 2014)). For example, using current values of time, and applying the government discount rate for economic cost comparisons. Updates are released to WebTAG, for example in terms of unit cost and price information, and changes to the lookups can be incorporated into this model.

The main drivers for the model was to get a greater understanding of the wider societal impacts in maintenance appraisal, such as vehicle operating costs and user time savings. For example, current guidance for vehicle operating costs derivation is in terms of speed and distance travelled, and road condition is not included. For this study, the model aims to test the impact of maintenance on road conditions, and so an approach for deriving the impact of conditions on vehicle operating costs was one of the core requirements for this study.

The prediction of road conditions under different budget constraints and maintenance policies is complex. Given that the focus was on carriageway condition prediction, rather than developing a bespoke approach solely for this study, it was proposed to adopt an approach already in use. Prediction tools are available to address a range of contexts, from detailed project level assessment (using detailed data) through to strategic level analyses (using coarser network level data). To be consistent with the latest developments for local roads in England, the Highway Maintenance Efficiency Programme (HMEP) Lifecycle Planning Toolkit (HMEP 2012) was selected for the prediction of pavement condition and maintenance need in this project. The HMEP Toolkit has been adopted unchanged, and the enhanced functionality required for the economic analysis and assessment of user and other impacts of maintenance has been “wrapped around” this core analysis element. With such an approach, it will be relatively straightforward in the future to incorporate updated versions of the HMEP toolkit as they become available.
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