Modelling best practice

The benefits of peer pressure

Infrastructure investment analyst Robert Bain describes a practice increasingly adopted by those who commission transport modelling studies to test and evaluate fitness-for-purpose and give additional confidence in terms of predictive capability and credibility: the 'peer review'

Professional peer reviews are commonplace in many disciplines: academia, medicine, scientific publishing and funding, accounting, law and, progressively more, in engineering. The review process centres on a critical evaluation of professional practice – or a work product – by suitably qualified and impartial individuals from within the same field. The objective is to ensure correctness and completeness, to substantiate the quality of technical analysis and uphold best-practice standards. Indeed, in some fields, activity that has not been through a peer review process is regarded with suspicion by fellow professionals.

When it comes to transport modelling, however, peer reviews are used to varying degrees. The process is championed in the USA by the Federal Highway Administration (FHWA) – and others – as part of the Travel Model Improvement Program (TMIP) initiative. Indeed, in late 2009, the FHWA published the TMIP Peer Review Process Guide under the banner "helping agencies improve their planning analysis techniques". The guide, available for free download from the TMIP website (http://tmip.fhwa.dot.gov), has, understandably, a strong domestic focus reflecting American planning policy and practice. Nevertheless, it is a comprehensive document that builds on the direct experience of its authors and its contents can be adapted to suit local circumstances.

Horses for courses

So what do peer reviews actually entail? My commissions suggest that different approaches are used in different circumstances. The depth and breadth of a review can vary depending on the nature and complexity of, and risks associated with, particular modelling assignments – and the level of reliance that clients place on modelling outputs. Similarly, the distinction between 'review' and 'audit' (the latter being more detailed and typically focussed on compliance with particular specifications/standards) is commonly blurred. However, my work as a reviewer has fallen into one of four general categories – as the real-world case studies on the next page illustrate.

A fresh eye

Being a peer reviewer is a position of some responsibility and relies on credentials, reputation, professional ethics and individual integrity. Issues that peer reviews uncover are not necessarily any reflection on those concerned. Yes – it is the role of the reviewer to spot problems or weaknesses, to detect errors, filter-out mistakes, eliminate bias and make suggestions or recommendations for improvements but the reviewer can also identify new perspectives to be considered, points of confusion that need to be clarified or questionable assumptions that should be disclosed if not changed. With increasingly sophisticated transport models it is seldom possible for modellers to spot every mistake or make every judgement call correctly, particularly on complex or highly specialised commissions. The peer reviewer simply offers a fresh eye, an objective second opinion from a professional with no direct interest in the specific conclusions or results from a given modelling assignment.

The role of the peer reviewer is advisory. Clients are under no obligation to accept the reviewer's opinion and, in some circumstances, elements of the work under review have to be taken on trust. However, it is a role that, with experience, can be performed quickly and inexpensively. Given the costs associated with getting modelling wrong on big transport investment projects, perhaps there is a broader role for peer reviews when modelling results are used as a basis for making significant policy, commercial or financing decisions.

In my experience, peer reviews of transport modelling assignments are more likely to be requested by private sector – rather than public sector – clients. This is particularly evident in cases where the transport modelling results will be used to support big-ticket road or rail projects seeking third-party funding. Credit rating agencies, insurance companies and the various providers of debt and equity finance will in many cases expect modelling reports to be accompanied by separate documentation from an independent peer reviewer. If this is not the case (and, often, even if it is), parties with financial interests may commission their own peer review of the modelling work as part of their due diligence efforts.

Should the public sector follow suit? Clearly a proportionate response is called for. Minor engineering improvement works or small-scale capital schemes that necessitate traffic modelling would not appear to be strong candidates for rigorous peer reviews. However, given comments made at last year's Modelling World conference regarding some transport modelling for large projects that was found to be deficient at a late (and sensitive) stage in the planning approvals process, the

argument could certainly be made for considering peer reviews. Many of initiatives taken by the public sector over the past 10-15 years in relation to transport have been designed to increase the sector's exposure to commercial practices and disciplines. Making more use of peer reviews could be regarded as simply being an extension of this trend.

Looking beyond individual modelling assignments, peer reviews hold the potential to benefit the transport modelling profession at large. Perhaps our professional institutions should take a lead? As models and modellers come under ever-closer public and political (and possibly legal) scrutiny, it becomes increasingly important to protect and enhance the profession's reputation. Professionalism has many connotations yet nothing is more important than the performance of quality work and the delivery of quality product. Increased utilisation of peer reviews could make a very positive contribution in that regard. ■

FOUR WAYS TO ADD VALUE TO MODEL DEVELOPMENT

CASE STUDY 1:
general desktop review
PROJECT:
US toll road ('managed lanes' project with dynamic pricing)
CLIENT:
insurance company

These tend to be short commissions (usually 5-10 days) that involve reviewing modelling reports and the associated technical documentation. Assumptions are assessed to check for reasonableness and to detect bias. This may involve background research to verify quoted parameter values and statistics. A number of tables and figures are re-created (to spot errors) and often the model is 'modelled' in a simple spreadsheet – again to sense-check the original technical work and to test the impact of alternative assumptions on the modelling results. Throughout the review, considerable attention is paid to growth and its underlying drivers. These commissions involve liaison with the client but seldom any contact with the original modelling team. In this sense they are blind (or, more accurately, 'single-blind') reviews. The output is typically a short 8-10 page summary written specifically from a financial perspective that can be appended to internal transaction appraisal documentation.

CASE STUDY 2:
specific desktop review
PROJECT:
Australian toll tunnel
CLIENT:
legal team

These commissions are similar in scope to the case study outlined above – but respond to very specific lines of enquiry. In this case, the legal team was advising a party that was considering taking action against a traffic consultancy for negligence. The consultancy's traffic and revenue forecasts had turned out to be hopelessly optimistic and, as a result, many small retail investors had seen the value of their investments plummet. Despite the consultants including the usual caveats about forecasts and forecast reliability in their small print, the language and tone of the report, together with the confidence intervals placed around the modelling outputs and the results from various sensitivity tests, suggested a conviction in the modelling results that departed from the earlier warnings. In addition, the client team found it difficult to believe that the magnitude of forecasting error could have occurred entirely accidentally. The resulting summary report identified and consolidated the review findings with a specific view to supporting case preparation and expert witness testimony.

CASE STUDY 3:
desktop review, site inspection and liaison with modelling team
PROJECT:
Eastern European motorway
CLIENT:
development bank

The case studies, as presented here, become increasingly resource intensive. Aside from reviewing the modelling documentation, in this commission guided site inspections were co-ordinated to provide a comprehensive overview of the planned project and its key attributes. Highway engineers and traffic experts were on-hand to respond to questions and conference calls were subsequently arranged with the transport modelling team for clarifications and to address issues of concern. In response, additional sensitivity tests were specified to examine further the traffic impact of alternative input assumption sets – highlighting the interactive nature (here) of the relationship between modeller and peer reviewer. Although the motorway was not tolled, the bank retained a strong interest in the traffic projections as they were key to its in-house economic evaluation (the results from which would guide its lending decision). This demonstrates the applicability of the peer review process to clients whose interest extends beyond financial analysis to an appreciation of the wider costs and benefits associated with transport investment.

CASE STUDY 4:
the 'embedded' peer reviewer
PROJECT:
UK high-speed rail concession
CLIENT:
pension funds

This recent three-month commission involved sitting alongside the technical consultants developing forecasts of passenger, and hence train path, demand. Although the reviewer remains independent, an intensive review involves working with the consultants on a daily basis, often being based in their offices. In this case, to the consultants' credit, instead of viewing the reviewer suspiciously as auditor or policeman, they embraced the concept and treated me as an additional resource within their team (albeit one that wasn't there to make their life any easier!). The various models – for different market segments – were developed with full transparency and I was party to all technical and modelling-related meetings and decisions regarding methodology and input assumptions. Technical notes were passed to me for review and approval before being forwarded to our clients – as were the draft and final reports. Because of the close working relationship, the employment of an embedded reviewer avoided any potential for the imposition of delays on project progress and, despite the intensity of the commission, the costs associated with the peer review role were reported to represent around one percent of total pursuit costs.