

TRANSPORT MODELLING

Key lessons learnt	Transport modelling is a tool which provides an indication of the level of demand between locations for the existing and future land use/population scenarios. Transport modelling provides indicative comparisons between different options for transport projects against a base case. It is not a substitute for empirical or experienced based design and assessment.
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Introduction

Transport modelling is a tool which provides an indication of the level of demand between locations for the existing and future land use/population scenarios, allowing evaluation of different projects or project options against one another.

Key considerations

Transport modelling operates at various project stages and levels of detail, ranging from strategic models that use citywide demand to intersection and pedestrian models used to support detailed project design and evaluation.

Transport modelling is appropriately used to compare the trajectory of population, employment and land use interaction, and how that affects the demand for travel across the day between major population centres.

Modelling available in NSW at a strategic level uses a volume/delay based method of assigning trips within the system. This sometimes results in forecast demand being higher than what the surrounding system can supply, with volumes exceeding the network capacity. This over-estimation of demand leads leading to an over-supply of capacity (e.g. additional lanes on a motorway, resulting in necessary upgrades on surrounding streets to support the additional lanes).

Transport modelling is good at predicting how increases in network supply (capacity) can induce more travel, but are poor at evaluating the community benefits of reducing capacity (e.g. removing a lane to provide a bicycle path or street dining), place making or behavioural change programs.

At the corridor/intersection level, strategic transport models should only be used to appraise the relative growth/decline in demand for the corridor/intersection and are not a substitute for empirical baseline data (demand, travel speed and travel time reliability, friction and public transport operations).

Empirical baseline data should cover more than a single day (as was historical practice) with the availability of large data sets (OPAL ticketing data, Public Transport Information Priority Systems vehicle tracking and speed/travel time data sets including Google, NOW, HERE and TomTom). This data should be used to determine reliability ranges (e.g. 95 percentile confidence interval or 2 standard deviations) as the basis of the comparison, using sensitivity testing.

Empirical data capture should always measure the upstream need. e.g. demand for the system rather than the downstream flow through a single point (intersection, bus stop, rail platform etc.).

Using modelling to evaluate projects, delays, travel speeds and volume/capacity or crowding ratios will be poor indicators of project effectiveness. Travel speed and volumes (in any mode) are highly dependent on weather conditions, the cost of travel (e.g. petrol prices), timing, travel choices and connectivity at the time of measurement. Small changes in network connectivity, reliability and configuration can significantly affect demand. Evaluation of projects should consider reliability (speed and time), accessibility and availability.

Transport modelling is often mode focused (e.g. cars) and lessens the consideration on other modes (e.g. freight or public transport). Appropriate metrics for evaluating transport projects are person-hours and tonne-hours rather than vehicle-hours, and a reliability index.

Project assessments often rely on targeting a specific Level of Service (LoS) for the mode at a time horizon (e.g. 10, 20 or 30 years) based on a metric such as delay or volume/capacity ratio. This can result in significant oversupply of capacity in early years, inducing more travel and shortening the life of the project (e.g. the M5 East). Transport models should be assessed at incremental points from the horizon to determine tipping points for upgrades.

While the NSW Government maintains its own transport models and has preferred software packages for its own projects, any model that is properly calibrated and

validated against international best practice can be used. While the use of preferred software packages is recommended, this can create a monopolistic system where the government is beholden to a single supplier. Any software package that has peer reviewed, published algorithms and techniques should be accepted for use.

A method for assessing place-making and reassigning space to alternate modes and non-transport activities should be developed by INSW or TfNSW.

Source material

Australian Transport Assessment and Planning (ATAP) Framework – Travel Demand Modelling (2018), ATAP

Guide to Traffic Management Part 3 – Traffic Studies and Analysis (2017), Austroads

Highway Capacity Manual 7 (2018), Transportation Research Board

Transit Capacity and Quality of Service Manual 3 (2017), Transportation Research Board

Traffic Modelling Guidelines (2013), Roads and Maritime Services

Transport Modelling Guidelines (2018) VicRoads

► About the author:

Graham McCabe has over 20 years' experience in transport modelling, project development, assessment and program management. During his career, he has led major projects including developing a new transport system for the Philippine's third largest city, Davao and the traffic and transport planning for the new Western Sydney Airport. He has worked in private consulting, Roads and Maritime Services, Transport for NSW and the City of Sydney and provided traffic assessment and modelling training for Roads and Maritime Services.

He is currently Director, Transport Advisory for Urbis.