

## **LEVEL PLAYING FIELDS OR LEVELLED MINEFIELDS: EXPLODING SOME MYTHS OF COMPARATIVE ASSESSMENT**

Ian Ker,  
Director, Policy and Planning, Transport Infrastructure Project  
Department of Transport, Western Australia<sup>#</sup>

### **Introduction**

The plea for comparative assessment of transport investments is as old as benefit-cost analysis itself. The technical impediments to the achievement of this ‘holy grail’ are well-known, at least in the profession – if not among decision-makers. Less well-known are the structural and institutional impediments to both the undertaking of comparative assessments and to the implementation of outcomes resulting from such assessments.

Nevertheless, increasing competition for resources and the increasing involvement of the private sector, in a number of roles, have rekindled interest in comparative assessment of transport investment proposals.

This paper discusses recent developments in respect of:

- Evaluating demand management against road building<sup>1</sup>, in the context of strategic asset management, which has demonstrated socio-economic returns from demand management several times those from investment in new road capacity;
- The impact of funding regimes, particularly the distinction between debt and equity funding of transport infrastructure; and
- Facilitating improved resource allocation in the face of hypothecated revenues, including ‘redefining’ products as well as more integrated assessment and decision-making.

### **Managing Demand Instead of Satisfying**

There is nearly half a century of experience in the planning of road systems to meet forecast travel demand and in the forecasting of that demand. Recently, there has been increasing recognition that some of the tenets of the forecasting methodology are flawed (SACTRA, 1994) and that alternatives to planning for the satisfaction of that demand are a legitimate response to what otherwise appears to be exponential growth (Goodwin, et al, 1991).

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<sup>#</sup> The views expressed in this paper are solely the responsibility of the author and should not be attributed to the Department of Transport.

<sup>1</sup> For simplicity of exposition, ‘roads/cars’ and ‘public transport/cycling/walking’ are treated as mutually exclusive in this paper. In practice, many roads provide facilities for the operation of public transport (buses), for cycling and for walking, although the operation of cars is often in conflict with the efficiency, safety and convenience of those other modes.

Transport's TravelSmart initiative has demonstrated that it is not only possible, but highly cost-effective to empower people to meet their access needs in ways other than the 'default option' of driving their cars – public transport, cycling and walking (James, 1998). Using conventional benefit-cost analysis and highly conservative values and assumptions, a pilot project in South Perth has been shown to produce benefits of 13 times the costs (Ker and James, 1999). South Perth has spare public transport capacity and good cycling and walking opportunities, but even in less favourable situations, benefit-cost ratios of between 6:1 and 8:1 have been estimated. These values are higher than those from most road projects.

It is often difficult to demonstrate the effectiveness and impacts of a different way of addressing an issue. In this respect, assessment or evaluation almost always favours the status quo, rather than change. For TravelSmart, the key was getting funding for a modest pilot project, but this brings its own problems for evaluation since there are likely to be economies of scale with larger programs – both on the supply side (no further set-up costs and more experienced staff working on the project) and on the demand side, where 'word of mouth' will reinforce the 'marketing' activity.

In exceptional cases, the opposite may apply. Hensher (1999), for example, argues that the benefits from new light rail systems are over-estimated in evaluations because of nebulous 'image benefits' and overestimation of patronage, which themselves hinge on a lack of provable and portable experience. It is most often the case, however, that lack of provability condemns a new way of looking at the world to oblivion.

Even once demonstrated to produce high socio-economic returns, a new initiative such as TravelSmart has no 'natural' source of funding, even though clear application of strategic asset management principles by road authorities would show that demand management is a better way of maintaining the level of service on the road system than some building of additional road capacity.

## **Numerator or Denominator**

The evaluation of travel demand management throws into clear focus the issue, sometimes regarded as of theoretical interest rather than practical importance, of what is counted in the numerator (as positive or negative benefits) and what in the denominator (as costs) in calculating the benefit-cost ratio.

The common convention is for capital costs to be included in the denominator, with all other impacts, including changes to operating costs and so-called 'externalities', in the numerator. Whilst it has been argued, on theoretical grounds, that the denominator should include all those items that are in limited supply (and therefore are 'capital' by nature – for example, does it really matter whether public funds are 'capital' or 'operating' in calculating the return on public finance from a project?), the argument has less often been extended to externalities. And yet many 'externalities' represent distinctly finite resources in the short to medium term (eg air quality) and the impacts might well not be reversible (eg death from traffic crashes, or global warming).

The issue is of no importance for calculating net present value. Nor is it of obvious importance for benefit-cost ratios when the comparison is between similar projects or projects that have a similar range and level of impacts –

for example, different ways of increasing road capacity to meet demand. It is, however, critical when the comparison is between alternative ways of addressing a problem with widely-different, or even opposite, impacts on externalities.

In the case of travel demand management (TravelSmart South Perth), the present value of actually- or potentially- non-reversible impacts was actually several times greater than that of the financial cost of undertaking the project. Adopting the ‘externality capital’ approach creates the conceptually-difficult problem of negative capital cost for an initiative – but does not mean that doing so is wrong.

Taking this one stage further, if we evaluate the overall transport system regarding fossil fuels as capital (not income), the returns from investing in fossil-fuel intensive modes (such as roads for cars) will be significantly reduced relative to more fuel-efficient modes (public transport) and modes that use only renewable fuels (cycling and walking).<sup>2</sup>

Road projects, on the other hand, at best have relatively small externality benefits and, where the induced traffic syndrome is apparent<sup>3</sup>, can have net externality costs.

## **Debt or Equity Funding**

One of the major shifts in transport policy in the past decade has been the recognition that cities need to view public transport, as much as roads, as infrastructure required for them to function efficiently. For cities such as Perth that are in a continuing growth pattern, this requires a continuing, substantial level of investment, in contrast to what has previously tended to be a sporadic and, to some extent, ad hoc approach. With conventional funding of public transport infrastructure, this will result in spiralling levels of debt and debt servicing charges that give the impression of a large ‘deficit’ even before a train or bus is run or a passenger carried.

Roads, on the other hand, are funded on an equity basis – the investment is paid for out of current user revenues, with no debt to be serviced and repaid by future generations.

The different means of funding investment in the two types of infrastructure result in a distorted perception of the relative costs of roads and public transport. In turn, this distorted perception can make it more difficult to further funding for the continued expansion of the public transport system.

Except for any transfers between metropolitan and other road users, the method of funding roads from dedicated revenue sources means that users currently exactly meet the full costs of building and maintaining roads, as funded

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<sup>2</sup> In the extreme, a road costing \$1million a kilometre to build for 10 000 vehicles per day would be charged with additional costs of around \$1.5m (present value @ 7% discount rate) over its life, if all the traffic were new, not diverted from other routes – reducing the return on investment by nearly two-thirds.

<sup>3</sup> It is sometimes argued that individual road projects make only a small difference to the costs of car travel and will not, therefore, induce additional traffic. The reality is that the impacts of an individual project may be small and hard to measure, but cumulatively projects must induce traffic. To argue otherwise is to ignore one of the fundamentals of economics and human behaviour – that consumers respond to lower prices by consuming more.

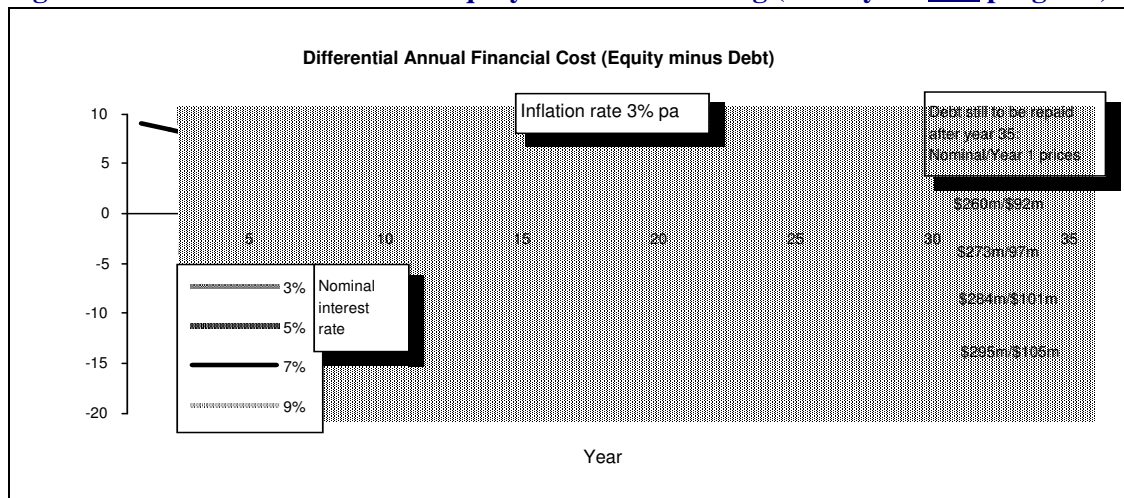
from State sources, on a year by year basis.<sup>4</sup> It follows that, if roads were funded through debt, user payments through hypothecated State charges would not meet the costs.

For an already-established continuing program, the annual financial difference between debt and equity funding depends upon the rate of inflation and the rate of interest, which have varied significantly over the relevant period. On the basis of a continuing real rate of interest (ie excess of nominal rate of interest over rate of inflation) of 3% per year, debt funding of a program with a real value of \$100 million per year would cost:

- a) \$132 million per year (in constant prices), for debt amortised over 20 years; and
- b) \$178 million per year (in constant prices), for debt amortised over 40 years (the typical ‘service life’ of roads).

In the case of a newly-initiated continuing program of the same amount, at inflation of 3% per year and interest rate of 7% per year (for illustrative purposes), debt funding requires a lower financial outlay in the early years, but becomes increasingly more costly over time (Figure 1).

**Figure 1 Differential Cost of Equity and Debt Funding (\$10m/year new program)**

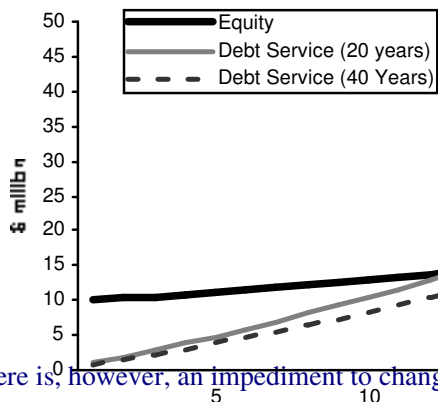


The discounted present value of this relative subsidy also depends upon the discount rate, but is likely to be in the hundreds of millions of dollars for feasible values.

Conversely, for a \$100 million per year public transport investment program, starting now, there would be substantial annual financial savings (Figure 2).

<sup>4</sup> Road user payments to the Commonwealth, funding from that source, road funding from local government rates and the costing of externalities are separate issues, which will not be dealt with here. A further issue that has not been adequately addressed in most work on road pricing or user charges is the difference between life-cycle costing and annual expenditure – the simplifying assumption underlying such work is often that expenditure equals cost, or, in road asset terms, that the asset is in the same condition at the end of the year as at the beginning, both in physical terms and in terms of the level of service to users. This condition will rarely if ever be met. In cities where traffic congestion is increasing, the true cost exceeds the level of expenditure on roads.

**Figure 2 Annual Financial Cost (Equity and Debt) for New Program (\$10m/year; 3% inflation; 7% interest rate)**



There is, however, an impediment to change, in the need to service existing debt, that increases the financial outgoings in the early years to a level that might well be seen to be too high for government to afford.

## Hypothecated Revenues

In addition to the ‘financial advantage associated with equity funding, road programs have the advantage of a dedicated funding source that leads to a self-reinforcing increase. The main sources of State funding for roads, all of which are hypothecated to road programs, are:

- The former State fuel franchise fee, now collected by the Commonwealth through Excise duty at 8.1 cents per litre of fuel and returned to the State;
- Vehicle registration fees; and
- Drivers’ licence fees

It is now well-understood that building roads, particularly in cities, generates additional travel by car – partly through taking trips away from other modes and partly because it becomes easier for motorists to travel further. If higher levels of car ownership and use then generate more revenue hypothecated to roads, more roads are built and the cycle continues.

The Perth Metropolitan Transport Strategy (MTS, 1995) has established targets for a progressive reduction in reliance on car use (from 63% of trips as driver in 1991 to 46 % in 2029) to ensure that Perth continues to be an attractive place for people to live and work. Achieving these targets will require a shift in the balance of funding in favour of public transport walking and cycling.

In simple terms, funding arrangements that have produced a car-driver mode share of 63% (up from 52% in 1976) and public transport share of 6% (down from 7% in 1976) require significant change to support the achievement of the objectives and targets of the Metropolitan Transport Strategy. Current arrangements do not provide sufficient flexibility for adapting to changing circumstances and changed directions for metropolitan transport reflected in the Metropolitan Transport Strategy and the State Planning Strategy.

## Towards a Resolution

Recognition of the importance of the political realm in evaluation and resource allocation has been recognised in practical ways in both the United States and the United Kingdom.

The Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) and its predecessor, the Intermodal Surface Transportation Efficiency Act (ISTEA) require that federally funded transport programs contain a balance of all modes and support the 'vision of an integrated transportation system helping to ensure Americans' prosperity and quality of life into the new century'.

Moreover, a proportion of federal transportation funds, including funding generated from fuel taxes, is set aside (FHWA, 1999) in TEA-21 for:

- *Transport Enhancement Activities*, which include (but are not limited to):
  - ◆ Provision of facilities for pedestrians and bicycles; and
  - ◆ Provision of safety and educational activities for pedestrians and bicyclists.
- *Transit Enhancement Activities*, "projects or project elements designed to enhance mass transportation service and are physically or functionally related to transit facilities", including (but not limited to):
  - ◆ Bus shelters;
  - ◆ Pedestrian access and walkways;
  - ◆ Bicycle access, including bicycle storage facilities and equipment for transporting bicycles on vehicles; and
  - ◆ Enhanced access for person with disabilities.

In the United Kingdom, the Transport Policies and Programs 'package' approach (DETR, 1998a) and national funding arrangements under the new 'Integrated Transport' (DETR, 1998b) banner require:

- Integration of transport policies;
- Improvement to and making best use of existing infrastructure;
- Reduced car dependency;
- Improved mobility of disable people .

New evaluation and assessment processes have been established to enhance choosing between different options for solving the same problem and for prioritising between proposals (DETR, 1998c).

The Transport Infrastructure Project (TIP) has been established in Transport WA, with similar intent, to promote and support:

- A co-ordinated and integrated vision for priority transport infrastructure requirements;
- The identification of gaps in existing transport infrastructure and inefficiencies in current systems;
- The funding of key projects;
- The identification of new infrastructure opportunities and realisation of their net worth (TIP, 1999).

TIP will seek to establish planning, evaluation and decision-making frameworks and processes that fully reflect a strategic asset management approach to infrastructure, including:

- Investing in new infrastructure;
- Enhancing the effectiveness of existing infrastructure through better management and use; and
- Finding non-asset solutions, for example managing demand to meet industry and community needs in ways that place less strain on existing infrastructure capacity.

In line with the philosophy behind the project, TIP will be:

- A finite project, concluding in June 2001, with its policy and co-ordination activities mainstreamed in the transport portfolio;
- Arrange an evaluation/assessment of its performance in 1999 against its stated objectives and incorporate information obtained in its further work.

## **Conclusion**

Evaluation and funding can too-easily combine to present structural impediments to change. At a time when change is the order of the day, the strategic rhetoric risks being strangled by the constraints of professional experience, on the one hand, and institutional inflexibility, on the other.

At the same time, novelty sometimes has its own value. As Hensher (1999) states: "...there are three major issues to be addressed; firstly, how to counter arguments about the very expensive 'image benefits' bestowed by a brand new light rail system ..., secondly, how to amend the funding mechanism so that the maximum benefit is obtained from the investment of public money in urban transport, and thirdly, how to amend the analytical process so that it does not over-estimate the benefits of a new public transport system."

The clear message is that we need to establish more objective information on the impacts of initiatives, through pilot projects, to establish agreement on the measures for evaluation and to ensure that resource allocation adequately incorporates the results of those evaluations.

The realisation of this lies only partly in the conventional realm of evaluation; it also requires that the evaluator influence the political realm – not in terms of particular outcomes but in terms of the process by which decisions are made and outcomes are determined.

The Transport Infrastructure Project, in Transport WA, has been established with the specific objective of improving information and processes for decision-making, including evaluation, in respect of transport infrastructure programs and projects.

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