The economic performance of transport projects

Using and interpreting the benefit/cost ratio to compare different transport initiatives.

Authors: Anna Percy, Organisational Strategy Manager, Auckland Regional Transport Authority

Kane Harton, School of Engineering, University of Auckland

Abstract

Economic evaluation plays an important role in the preparation of funding applications for transport projects in New Zealand, but has in the past been considered more useful for ranking similar projects than for comparing different types of transport investment. This was true, not least because of differences in the values used in the economic evaluation of different categories of transport project. The release of a new edition of economic evaluation manuals by the New Zealand Transport Agency in January 2009 created a consistent suite of procedures, based on the same underlying economic values, which now apply to transport projects from road building to Travel Plans.

This paper picks up on the opportunity this creates, and examines the benefit/cost ratios calculated for a sample of road, public transport and travel demand management projects. The analysis shows no statistically significant differences between road capacity expansion, public transport and demand management projects in terms of their average benefit/cost ratios, due mainly to large differences in project benefit/cost ratios within work categories. Further insights are provided by a detailed analysis of the benefits and costs of a cluster of projects at the Kingsland end of Sandringham Rd. Taken together, both the broad and the detailed analysis provide insights into the projects themselves, the assumptions and drivers of the evaluation process, and how transport projects can best contribute to economic growth.

Background

Internationally, economic evaluation of benefits and costs forms an important part of the decision-making process for planning and funding transport projects (Hayashi, 2000). Most economic evaluation processes include valuation of travel time savings, safety benefits and environmental impacts for road construction projects. Recent trends are towards more comprehensive analysis frameworks, assessing a wider range of impacts for a wider range of multimodal transport projects (Bristow, 2000).

While there is an amount of literature comparing and contrasting the economic evaluation systems in place globally, the authors were unable to find any peer-reviewed literature which takes an existing evaluation system and analyses how this affects the ranking of projects across different transport modes. Litman (2006) suggests that the evaluation of transport projects by assessment of a limited set of monetised benefits is generally unsuitable for comparing transport projects that involve different modes or TDM strategies, but that this is not a fundamental problem with economic analysis per se, but relates to the use of a partial or biased analysis methodology applied unevenly across transport modes. Where a comprehensive analysis is undertaken of all costs and all benefits, including values for nonmonetary costs and benefits, valuable information is generated to inform choices about transport investment.

In New Zealand, economic evaluation has an important role in the transport funding allocation process. Every improvement project funded by the NZ Transport Agency through the National Land Transport Fund must be the subject of an economic evaluation. The evaluation calculates a benefit/cost ratio which is used alongside other criteria to rank projects in priority order and to inform funding decisions.

Criteria other than economic evaluation also have a place in transport project prioritisation in New Zealand, but these “other” criteria, and their weighting relative to the economic evaluation, has changed over time. By contrast, the economic evaluation methodology has been stable (though constantly evolving) since at least 1991, when Transit New Zealand first published the *Project*

evaluation manual (PEM). New information is incorporated via regular reviews of the manuals, including major studies in 1993 (Works Consultancy, 1993) and 2005 (Booz Allen Hamilton, 2005). In keeping with the global trend noted by Bristow (2000), the range of transport projects which can be assessed using the NZ Economic Evaluation Manual has become more multi-modal over the years.

All this incremental change had created some issues of its own, and in 2007-2008 Land Transport NZ resourced a major overhaul of the manuals. One of the issues addressed in the overhaul was consistency between the economic evaluation of different categories of transport project.

One example of an inconsistent approach was given by Donovan et al (2008), who noted that travel time benefits of road construction projects in New Zealand were generally not adjusted for the effect of induced traffic, yet travel time benefits for public transport, walking and cycling projects were halved because:

> *"…reduction of congestion is likely to make private vehicle travel more appealing for other potential road users, which will partially offset the congestion reduction benefits. This generated traffic effect should be valued as a disbenefit equivalent to 50 percent of the congestion reduction benefit."*

Another example was the value of time. Prior to 2008, the value of time was allocated in such a way that a time saving to a vehicle driver for trips other than commuting and in work time was valued at almost twice the rate of an equivalent time saving to a public transport user, while a time saving to an existing pedestrian was specifically noted as having no value at all.

Further, the discount rate of 10%, which was lowered in August 2008 to 8%, was higher than the highest value used in transport economic evaluation in Europe (which range from 3% in Germany to 8% in France (Bristow, 2000)). This led to a systemic bias towards "quick fix" transport solutions over longer term investments.

Not surprisingly, road projects which provided short-term benefits to car drivers tended to score more highly in the economic analysis. This naturally led people to the conclusion that such projects were "more economically efficient". The view that investment in roads is done for economic reasons, and public transport, walking and cycling for social or environmental reasons, spread widely. Only a few people directly involved in transport modelling and economic analysis understood *why* the calculations gave this result.

The inconsistent treatment of induced traffic, the value of time, the high discount rate and other issues were addressed in the preparation of the current Economic Evaluation Manuals, EEM 1 released in September 2008 and EEM 2 released in January 2009. The current manuals come very close to being a consistent suite of evaluation procedures, based on the same underlying economic values, which apply to transport projects from road building to Travel Plans. This is a significant achievement and forms the intellectual underpinning for all of the work described in this paper.

This paper reviews a range of transport projects which have been evaluated using the economic evaluation procedures set out in the new manuals. The aim is to establish, on this more level playing field, whether there are statistically significant difference in benefit/cost ratio between state highway projects, local road improvements, public transport and sustainable transport projects.

A small set of linked projects in the Sandringham Rd area is then looked at in more detail in order to draw conclusions about the value of economic analysis in assessing benefits across different types of transport project.

Evaluation of a selection of transport projects

Selection of projects to include in this comparison

This part of the study commenced with a list of 79 transport improvement projects representing a mix of state highway projects, local road improvements, public transport, walking and cycling projects.

These 79 improvement projects were submitted to ARTA in late 2008 for inclusion in the draft Auckland Regional Land Transport Programme 2009/12 (RLTP), with some economic evaluation information provided at that time (December 2008). They form a subset of the 793 projects and project phases submitted to the draft RLTP. Planning and administration projects, maintenance and minor safety projects do not require benefit cost information, and some improvement projects included in the 3-year RLTP were not, at that time, sufficiently well scoped for an economic analysis to be undertaken. Choosing projects for which a benefit/cost was available in the draft RLTP should provide an unbiased sample of the overall programme in most ways, but with a tendency to include well-defined projects with a robust benefit/cost calculation.

In July 2009 the project data was updated to capture any changes in the economic evaluation values for the 79 projects – for public transport and sustainable transport projects, applicants needed to recalculate the benefit/cost ratios based on the new Economic Evaluation Manual volume 2 which was published in January 2009. This process also found that some projects had changed in cost and/or scope between the draft and final Land Transport Programmes.

Meanwhile a policy change had made rail stations in the Auckland region eligible for funding through the RLTP, so three ARTA rail station projects for which a benefit/cost had been calculated were added to the sample of projects, bringing the total to 82.

Results

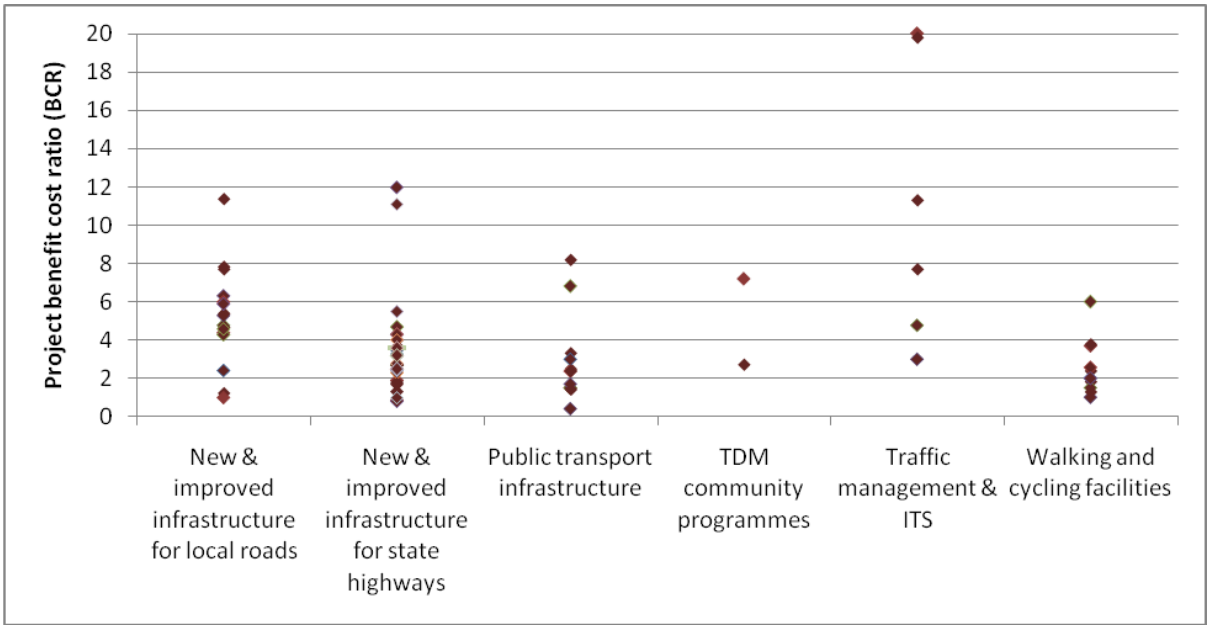
The 82 projects are grouped in terms of activity class categories, which are allocated using ARTA's system as described in Martins (2009) paper to this conference, to fit within the categories used in the Regional Land Transport Strategy.

The 82 projects analysed ranged in benefit/cost from 0.4 to 30. Within this sample, there appears to be no statistically significant pattern linking the category of project to the benefit/cost ratio. All categories of project had a standard deviation which was large in proportion to the average benefit/cost ratio, and no two averages differed by more than one Standard Deviation.

	# schemes	Average BCR	Std dev (BCR)
New & improved infrastructure for local roads	16	5.2	2.6
New & improved infrastructure for state highways	35	3.4	2.3
Public transport infrastructure	12	2.9	2.3
TDM community programmes	2	5.0	3.2
Traffic management & ITS	6	12.8	10.4
Walking and cycling facilities	11	2.6	1.5

This pattern of wide differences within categories, and small differences between categories, is shown in Figure 1.

Figure 1: Benefit/cost ratios by scheme type for 82 improvement schemes



Interim conclusions

It is difficult to draw conclusions from such a disparate range of projects. It is, however, clear from the data that:

- Within this sample of 82 projects, new and improved road infrastructure projects do not have significantly higher benefit/cost ratios than other categories of project.
- Traffic management projects in this sample have the highest average economic efficiency. Although this difference is not statistically significant, some of these applications represent "packages" of multiple projects, implying that traffic management has the potential to outperform other categories of project in terms of benefit/cost.
- The cycling and walking projects in this sample have lower economic efficiency than other categories of project. However eight of the 11 projects in this category address the local severance effects of State Highways and could be seen as mitigation measures rather than standalone projects.

The obvious next step is to look into the reasons behind these differences. However this task proved more difficult than anticipated. Very few funding applications include enough detail to re-calculate the benefit/cost ratio, or to examine the range of benefits by splitting out travel time savings, environmental benefits, safety benefits and so forth. Even where sufficient information can be accessed from the funding database LTPonline, the permission of project owners must be sought to use this information as it is generally not in the public domain.

Following many enquiries, a set of linked projects in the Sandringham Rd area were selected for analysis in more detail.

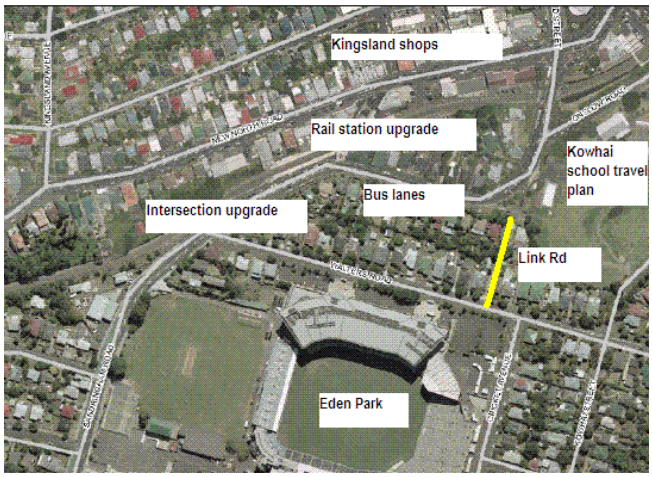
Sandringham Rd

A set of five linked projects has been proposed by ARTA and Auckland City to address traffic issues at the Kingsland end of Sandringham Rd. The component projects, and their benefit/cost ratios, are:

• Upgrading of the Walters Rd/Sandringham Rd intersection • Construction of a new link road providing more direct walking and cycling access between Eden Park and the Kingsland shopping centre • A new outbound bus/bike lane, linking existing bus lanes on New North Rd to those further down Sandringham Rd (this stretch of Sandringham Rd already has an inbound bus/ bike lane)	3.3
• Upgrading of the Kingsland rail station to improve provision for capacity crowds	1.4
• Implementation of a Travel Plan at Kowhai Intermediate School (complete)	3.5

The urgency of these projects is affected by the choice of Eden Park as the main venue for the 2011 Rugby World Cup. However the projects address a number of transport issues typical of urban Auckland, in ways that will have lasting benefits beyond 2011.

Figure 1: Map of Sandringham Rd area and proposed transport projects



Sandringham Rd provides a useful microcosm which illustrates a range of issues relevant to other transport projects in the Auckland Region. A very high quality of project information and benefit/cost analysis was made available by Opus Consultants for these projects, and the project owners, ARTA and the Auckland City Council, gave permission for the information to be used for this paper.

In the following sections, issues which affect the benefit/cost calculation for this specific package of projects are outlined. Where appropriate, some conclusions are drawn about the benefit/cost analysis process, and of how the issues illustrated in this microcosm may also be relevant to transport projects in general.

Benefits of the Sandringham Rd component projects

The Auckland City projects in the Sandringham Rd area comprise:

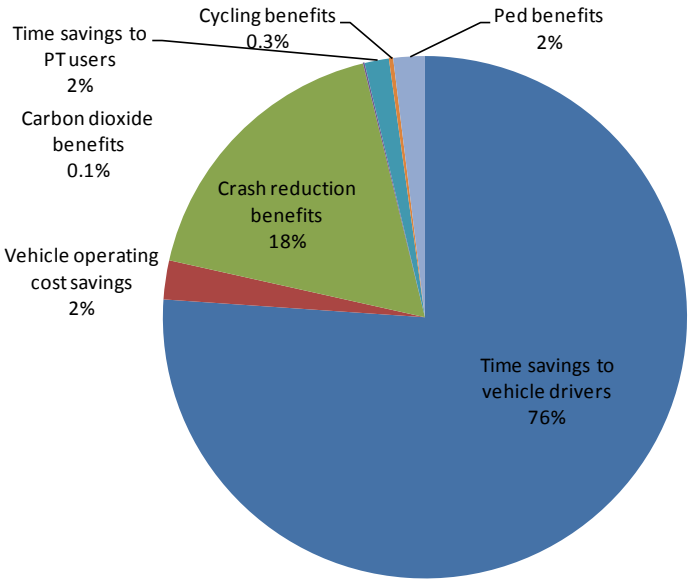
- Upgrading of the Walters Rd/Sandringham Rd intersection
- Construction of a new link road providing more direct walking and cycling access between Eden Park and the Kingsland shopping centre

- A new outbound bus/cycle lane, linking existing bus lanes on New North Rd to those further down Sandringham Rd (the area already has an inbound bus/cycle lane)

Neither the costs nor the benefits of these component projects can logically be split from each other as the projects are closely interrelated.

According to this analysis, three quarters of the total benefit of these projects (76%) is from travel time savings to vehicle drivers. Crash reduction benefits (mainly from the intersection upgrade) are also significant at 18% of total benefits, as shown in Figure 2.

Figure 2: Components of the transport benefits of Auckland City Sandringham Rd projects



Vehicle operating costs (2%) are a smaller factor than time savings to vehicle drivers, but derive from the same benefits to traffic flows, which in turn are principally due to the intersection upgrade.

The remaining four categories of benefit make only a minor contribution (4.4%) to the overall benefits calculated, although they are important strategic components of the project:

- **PT user time savings** are relatively small given the short length of the facility (750m). This underestimates the importance of this link, which connects the New North Rd outbound bus lane with the existing lane further down Sandringham Rd, and complements the continuous inbound bus lane already in place. In principle, providing this "missing link" should have greater benefits than an arbitrary 750m of bus lane, but this has not been recognised in the benefit calculation. The calculation does not include the benefits from increasing PT patronage. In part this is because of difficulty obtaining baseline PT patronage data and growth projections for Sandringham Rd, which is a NZ Bus commercial service.
- **Cycle benefits** derive mainly from the health benefits of cycling. This scheme includes a 750m shared bus/cycle lane with a width of 3.25 metres. In the economic analysis, benefits are low because of the low number of cyclists (about 50) who currently travel down Sandringham Rd in the 2-hour evening peak, so even with a major step up in cycling (20%) due to the scheme, cyclist numbers and hence benefits are still low. The Auckland Regional Council's research shows that most Aucklanders think it is "usually unsafe" or "always unsafe" to cycle. Short cycle links such as the one proposed are unlikely to change this, especially if they are not of a high standard. A 3.25 m shared bus/bike lane is much narrower than the recommended width for a shared facility (4.5m), and is particularly inappropriate for schoolchildren. Given that the site is adjacent to an intermediate school there would be demand for an offroad facility but there is no space to provide one. Data from the School Travel Plan surveys shows that many cyclists are coming from the Eden Park side of the

school, hence The Link may generate more cycle trips to Kowhai Intermediate School than the shared bus/bike lane.

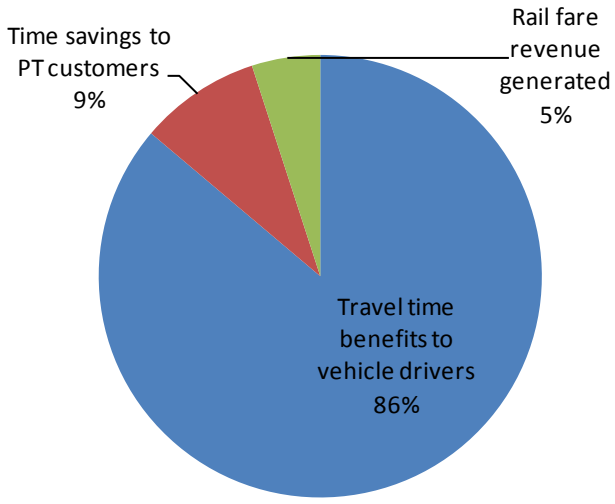
- **Pedestrian benefits** derive mainly from the health benefits of walking. Simplified procedures exist to calculate these benefits on a per-new-user or a per-km basis. The number of new users is estimated for a normal weekday, and is relatively modest (a 9% increase on actual counts), hence the low contribution to total benefits. The alternative calculation, on a per km basis, actually gives a negative benefit for The Link, since it provides for a shorter walk and hence fewer health benefits for existing pedestrians.
- **CO_2 reduction** are valued at 4% of vehicle operating costs, which in turn vary with speed, gradient and roughness of the road. Since about half of vehicle operating costs are fuel costs, this represents an estimate of carbon externalities as 8% of total fuel costs, which at the current cost of regular petrol equates to a cost of carbon of $58 per tonne. This value is at the high end of World Bank estimates of the cost of CO_2 reduction in industrialised countries, which range from $15 to $100 per tonne. Even at this high value, CO_2 reduction benefits have no real impact on the benefit/cost calculation for these projects. One of the authors (Percy, 2007) has demonstrated for other Auckland transport projects that project costs so high that even projects which are highly successful at reducing car travel do not generate CO_2 benefits which are significant in proportion to the costs.

Upgrading of the Kingsland rail station to improve provision for capacity crowds

This ARTA project addresses the capacity constraints of the current Kingsland Station by adding length and width to the platform, and constructing an underpass to access the inbound station platform.

All of the benefits of this project occur when major events are held at Eden Park, as the underpass will be closed off at other times.

Figure 3: Components of the transport benefits of the Kingsland rail station upgrade



Most (86%) of the benefits of the rail station are to vehicle drivers due to reduced traffic congestion, as an estimated 25% of the crowd (15,000 people) will travel by rail. Although these trips do not occur in the commuter peak, the presence of traffic congestion when major games occur is obvious.

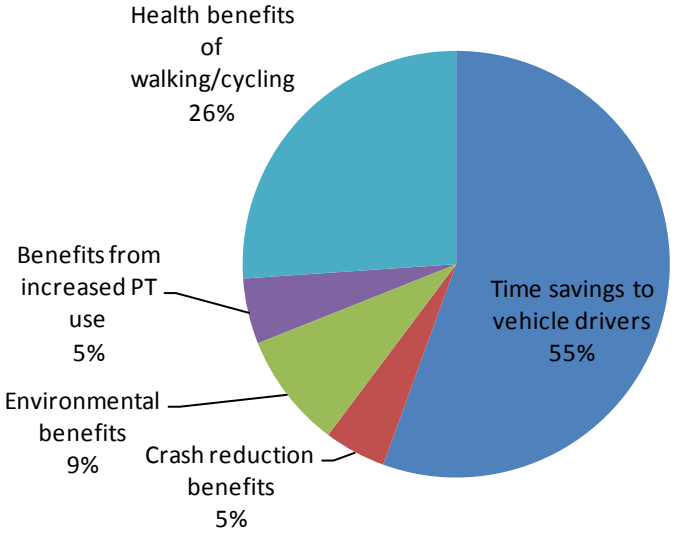
There is also a travel time saving to rail customers, who will have easier access to both station platforms - the current overbridge becomes very congested when Eden Park hosts major events.

Additional fare income from the additional rail passengers forms 5% of the benefit stream. For major games, a portion of ticket revenue is passed to ARTA in return for “free” travel to the game. The aim is to encourage as many of the crowd as possible to arrive by public transport, to minimise traffic and parking issues.

Implementation of a Travel Plan at Kowhai Intermediate School

This project is complete; Auckland City and ARTA jointly developed a Travel Plan with Kowhai School during 2006 and 2007, and speed bumps were installed, and traffic signal phasing changed, in mid-2007. The benefits of the Travel Plan were calculated based on a simplified procedure which forecasts 13 fewer children arriving at school by car each morning, of which half shift to walking/cycling and half to public transport. In reality, there were 21 fewer students travelling by car to Kowhai school in 2008 than 2007, with all of the change attributable to a growth in rail patronage.

Figure 4: Components of the transport benefits of the Kowhai School Travel Plan



Once again for this project, the majority (55%) of assessed transport benefits are travel time savings to vehicle drivers, because of reduced car travel at peak times. Reduced traffic also leads to a crash reduction benefit.

Environmental benefits make up 9% of the total benefits, based on 10c/km environmental cost of peak car travel. This high value is due to the significant impact on local air pollution of short car trips on "the school run". In view of the actual results for Kowhai, the health benefits of walking/cycling are probably overestimated, and the benefits of increased PT use underestimated.

Findings about the evaluation methodology

Travel time savings

This analysis clearly shows that travel time savings to vehicle drivers is the deciding factor in the economic evaluation, for the five very different projects considered. Safety and public health can also be important factors for some projects. Environmental benefits, while quantified, are valued at a rate that means they do not make enough difference to the benefits to affect the ranking of projects.

Thus the economic evaluation methodology will lead to prioritising transport projects which save the most travel time, in proportion to their costs. This situation is not unique to New Zealand; internationally, the value attributed to travel time savings is the key driver of public investment in road and transport projects (Mackie 2001).

Yet some simple questions about travel time savings remain highly controversial. Equating personal travel time with economic benefits assumes that people reinvest any travel time savings in other, more economically productive activities. Metz (2008) reviews the evidence on travel time and concludes that there is little empirical evidence to support this proposition; rather travellers take the benefit of improvements to travel time in order to access to more distant destinations made possible by higher speeds.

Criticism of the notion of funding transport projects based on travel time savings goes back at least to the 1980s (Atkins 1984) and continues today. Roland Sapford presents a damning critique of this aspect of transport economic evaluation on YouTube, saying “By that argument, the State would buy everyone a dishwasher”.

Despite conceptual problems with valuation of personal travel time, it appears that New Zealanders are willing to pay, through fuel taxes, for travel time savings. The introduction of full hypothecation of fuel taxes to transport, introduced in the 2008 Land Transport Management Act, was a popular policy. Saved travel time is valued by users and is clearly a benefit.

But is it an *economic* benefit? For professional drivers and dedicated freight vehicles, time clearly equals money. But the majority of travel time benefits as assessed in the evaluation are for private vehicle travellers. The distinction between travel time savings and actual revenue is blurred in the public debate. For example, the AA state in a 2009 press release that:

> “The Western Ring Route will soon deliver New Zealand an economic benefit of approximately $840 million every year."

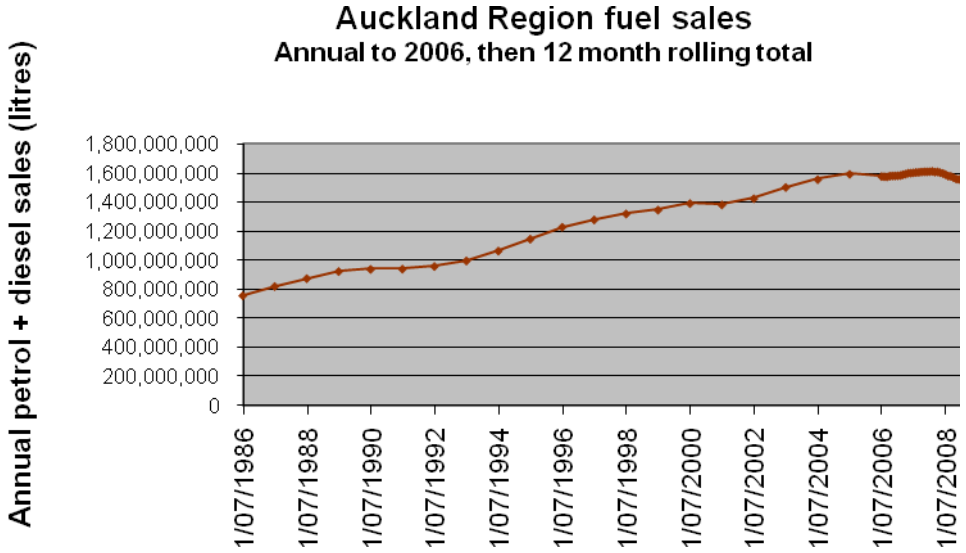
This is not an accurate reflection of the facts; the terms “travel time savings” and “economic benefits” are not interchangeable, any more than safety benefits are entirely “social benefits”.

Traffic growth

All benefits of these projects are evaluated against an assumption of ongoing traffic growth, based on the continuation of past trends. The actual rate of traffic growth depends on Auckland’s wider economic performance, the cost of fuel, and other external factors – including in future any binding international commitments to reduce New Zealand’s contribution to climate change.

Traffic growth in the Auckland Region is not measured directly, but fuel sales are a good proxy measure. Annual petrol and diesel sales in the region doubled in the two decades from 1986 to 2005, but have not risen significantly since. This calls into question the levels of future benefit calculated for transport projects which are evaluated on the assumption of ongoing traffic growth.

Figure 5: Fuel sales in the Auckland Region 1986 to May 2009



Sensitivity testing for the impact of traffic growth and other trends on the benefits and the costs of the Sandringham Rd projects, and transport projects generally, is planned as the next stage of this research project.

Interdependencies

The Sandringham Rd projects provide a clear example of a set of three interdependent projects (the road upgrades, the rail station and the School Travel Plan), which have been assessed as if they were being delivered in isolation from each other and from the existing infrastructure. While all transportation investments are to some extent inter-related, such that at a certain point a comprehensive analysis would become unmanageably complex, there seems to be little appetite to quantify and thus choose projects in a smart, co-ordinated way taking into account other investments and current infrastructure. In practice, both the costs and the benefits of these three projects are connected, and analysing them in isolation is a missed opportunity to better understand the overall benefits and costs of the projects and under what circumstances these will change.

The more general analysis of 82 transport projects did find some instances where interdependent projects were analysed more comprehensively. The best example of this was the package of transport projects in New Lynn, being delivered by three separate transport agencies, for which a high-quality assessment of the benefits and costs of the entire package had been undertaken. In general, however, the opportunity to look at interdependencies between transport projects appears to have been missed, especially in cases where projects are being delivered by separate organisations.

Property purchase

Almost half (43%) of the project cost for Auckland City's Sandringham Rd projects is property purchase. Auckland City has purchased two residential properties to enable the construction of The Link, and further land take is required from residential properties on Sandringham Rd and Walters Rd to enable the intersection upgrade, and from residential and Eden Park Trust Board properties on Sandringham Rd to enable bus lane construction and to provide for widening of the rail platform.

In the benefit/cost calculation for the Sandringham Rd projects, the full cost of land purchase is included as a cost against the Auckland City projects. A fairer comparison of the benefits and costs of the project components would be achieved if some of the property purchase cost were allocated to the rail station project.

Where property owners require compensation for land taken for transport projects, this is treated as a cost of the project. Land already held for transport purposes is not given a value in the benefit/cost analysis, even though this land could potentially be used for other purposes. In the case of this project, land purchase is a very significant component of the project cost and its inclusion has the effect of lowering the benefit/cost ratio in direct proportion to its impact on project cost.

Property purchase is a significant issue in Auckland transport projects generally. The 82 transport projects included in the analysis in Part 1 of this paper include $68 million of property purchase. Auckland has very little undeveloped land designated for transport purposes, and the major remaining designations will be used for transport projects in the near future. As Auckland's population and economy continue to grow, more Auckland transport projects will require property purchase. This will have the effect of lowering the benefit/cost ratio of construction projects relative to projects which enhance the effectiveness of existing transport corridors. It will also lead, over time, to lower benefit/cost ratios for construction projects located in Auckland relative to projects in other parts of New Zealand where undeveloped transport designations are still available.

Findings about the Sandringham Rd projects

Wider economic benefits

None of the economic analysis above explains why the specific projects proposed for Sandringham Rd are important for the economic success of Auckland. These projects will generate time savings to vehicle drivers, but so too will all of the 82 other projects analysed in the first half of this paper. Based on the economic analysis, the rail station will only be used on game days, the road projects (including The Link) will only be used on normal weekdays, and the School Travel Plan is unconnected with any of the new projects. In reality, there is a strategy linking these projects, but this is not reflected in the economic analysis.

The actual point of the projects is to host a great Rugby World Cup, and to generate lasting economic benefits to Auckland from doing so. The Link has the potential to be the most economically significant component of this project, because it brings Eden Park within the walking catchment of Kingsland Shops and vice versa. It is possible to deal with the "agglomeration effects" of closing the distance between economically significant activities within the Economic Evaluation framework, although this is a daunting evaluation task and is usually only attempted for very large projects.

More broadly, the redevelopment of Eden Park for the World Cup has significant implications for traffic in the local community, including the school. Improving the local road environment will contribute to a successful event and mitigate some of the traffic impacts of the development. Completing the bus lane will close the "missing link" in a wider network of bus priority measures, and the cycle lane is a priority link in the Regional Cycle Network.

Thus only a small subset of the real economic benefits of these projects are captured within the benefit value used in the economic analysis.

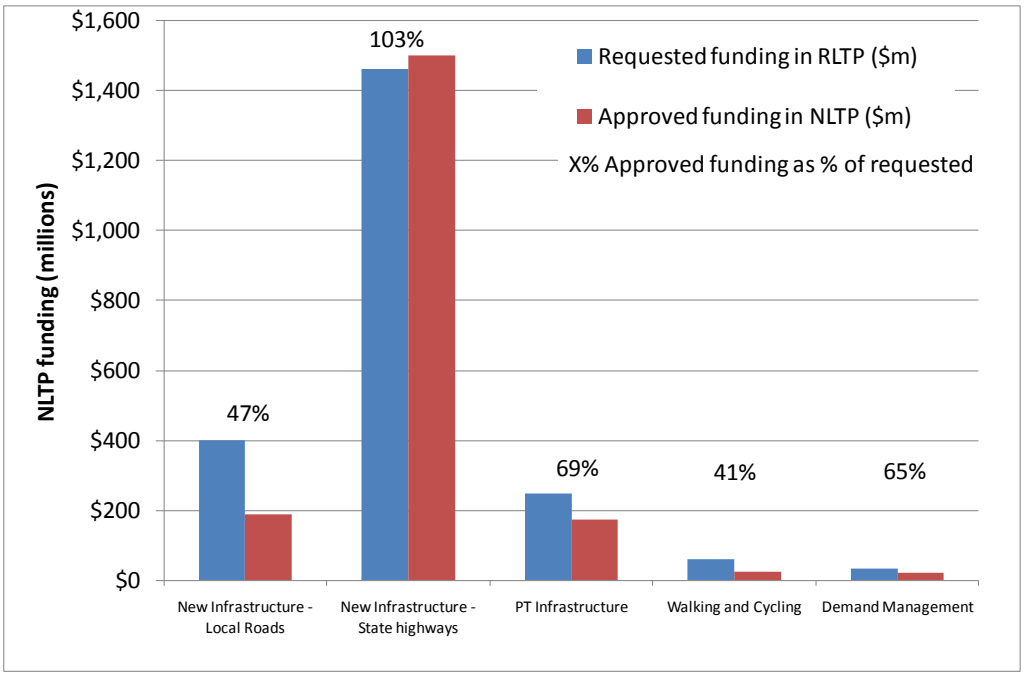
Funding decisions

As noted in the introduction, the authors were unable to find any peer-reviewed literature which takes an existing evaluation system and analyses how this affects the ranking of projects across different transport modes. This paper has looked at the application of New Zealand's economic evaluation procedures to 82 projects in outline and to five in detail. To complete this paper, the final funding decision in relation to these projects is now discussed.

In the 2009/12 National Land Transport Programme, the national share of the costs of the road projects and rail station upgrade for Sandringham Rd were approved. The Travel Plan for Kowhai Intermediate School is now complete, but funding from the National Land Transport Programme for future School Travel Plans and for walking and cycling infrastructure around schools is less than half of the level requested by local councils.

The funding decisions in the National Land Transport Programme are made at a high level, and it has not proved to be possible, within the time available, to untangle the effects of these decisions on each of the 82 projects considered in the first section of this paper. Over the coming months, Auckland transport agencies will be re-evaluating local road, demand management and walking and cycling projects in order to live within a reduced funding envelope. The role of benefit/cost information in this review is not yet clear.

Figure 5: Funding allocation decisions – sum by category of project



Conclusion

New Zealand's economic analysis framework has developed over many years and continues to improve. It is not always perfectly applied, and for small projects in particular a full analysis can be a daunting task, while a simplified analysis can miss important benefits.

A wide range of benefits are considered in the economic analysis of transport projects in New Zealand. Some of these benefits, such as travel time to freight vehicles, are accurately described as "economic benefits". However travel time savings to private vehicles dominate the calculated benefit values. While these are real benefits, it is misleading to refer to travel time savings as "economic benefits", especially in public debate.

An analysis of 82 projects across different modal categories showed that no one category of project has a clear advantage over other categories in terms of the level of benefit per unit cost. Currently, the better traffic management, public transport and sustainable transport projects in Auckland save as much if not more travel time per unit cost as typical road projects. Road users are willing to pay for travel time savings, and should be aware that these savings can be generated by good projects across all categories of transport activity.

Depending on trends in fuel price and other drivers of traffic growth, future estimates of traffic congestion could be over-stated and hence the travel time benefits systematically over-estimated. Land purchase is another looming issue for the future; as existing transport designations are used and land purchase is required for more transport projects, costs for capacity expansion projects will rise, and it will become more important to make best use of existing corridor capacity through traffic management, public transport and demand management projects.

The economic evaluation of transport projects forms part of a funding approval process which also includes consideration of other factors at both an officer and a political level.

Acknowledgements

The authors wish to thank the NZ Transport Agency for advice and assistance, and Opus Consultants for making available their detailed benefit/cost analysis of the Auckland City Sandringham Rd projects.

References

AA Media Release 2009. Toll-free Western Ring Route good news for motorists. http://www.aa.co.nz/about/media/Pages/Toll-free-Western-Ring-Route-Good-News-For-Motorists.aspx

Atkins, S., 1984. Why value travel time? The Case Against. Journal of the Institution of Highways and Transportation, July 1984, 2-7.

Auckland Regional Council 2009: Regional Land Transport Strategy Monitoring Report

Tritt, M., 2006. Auckland, City of Cars, Episode 3. YouTube video http://www.youtube.com/watch?v=LO3d13EOfRI&feature=related

Booz Allen Hamilton, 2005. Surface Transport Costs and Charges Study. Ministry of Transport New Zealand (www.transport.govt.nz).

Bristow, A., Nellthorp, J., 2000. Transport project appraisal in the European Union. Transport Policy 7, 51-60

Donovan, S., J. Genter, B. Petrenas, N. Mumby, T. Hazledine, T. Litman, G. Hewison, T. Guidera, L. O'Reilly, A. Green and G. Leyland, 2008. Managing Transport Challenges when Oil Prices Rise, NZTA research report 357, Appendix B. http://www.ltsa.govt.nz/research/reports/357.pdf

Hayashi, Y., Morisugi H., 2000. International comparison of background concept and methodology of transportation project appraisal. Transport Policy 7 73-88

Litman, T., 2006 What's it worth? Economic Evaluation for Transportation Decision-Making. Victoria Transport Policy Institute. http://www.vtpi.org/worth.pdf accessed 27 June 2009.

Mackie, P., Jara-Diaz, S., Fowkes, A., 2001. The value of travel time savings in evaluation. Transportation Research Part E 37 91-106.

Martins, A., 2009. Prioritisation process for funding competing transport projects. Australasian Transport Research Forum 2009.

Metz, D., 2008. The Myth of Travel Time Saving. Transport Reviews, Vol. 28, No. 3, 321–336.

Percy, A., Kota, S., 2007. Reducing vkt, reducing emissions: a long road ahead. Australasian Transport Research Forum 2007.

Works Consultancy 1993, Land Transport Externalities, Transit New Zealand (Wellington).

World Bank 2009 Carbon Finance - Frequently Asked Questions www.worldbank.org