



# Methods for appraising interrelated transport projects

Deciding to invest in a transport project usually involves a cost-benefit analysis and benefit-cost ratio. But if there are other interrelated transport projects planned, how do we factor in their potential value?

The benefits of a potential project may vary if uncertain future transport projects are also delivered. One benefit-cost ratio (BCR) won't capture them - instead, a range of BCRs will most accurately describe the uncertain future.

This report sets out a systematic method to develop a range of BCRs. Waka Kotahi can use these in the decision-making process when project benefit interdependency exists. The researchers developed this method from:

- searching literature on project interdependency, programme formation and cost-benefit analysis (CBA)
- investigating current practice with colleagues
- a sketch model exercise where they developed a 5-project transport model to explore demand growth, congestion and re-routing effects.

The researchers illustrated and tested the method on a cycleway programme in Christchurch. They then refined it and now recommend it for use in New Zealand transport CBAs.

## Practical issues

The practical issues raised by project interdependency are often uncertainty, scale and potentially bias.

- The benefit of a proposed transport project can increase if complementary future transport projects are also delivered.
- The benefit of a proposed transport project can decrease if future projects are competing, such as when an alternative route or mode is provided.
- In principle, the true marginal benefit of a candidate project can be measured by the decremental test, found by modelling all projects with and without the candidate project.
- In practice, it is often unknown whether future projects will actually be delivered, even when those projects sit within the long-term plans of government bodies.
  - First, we need to identify future transport projects that may create project interdependency, which can be many.
  - Then we estimate the scale of interdependency, which can require much modelling.
  - Finally, we present what may be a complex situation to decision makers in an efficient and transparent manner.
  - The process should also counter potential behavioural biases that can lead to competing projects being dismissed prematurely, or simply not being searched for.

## Key components and core steps

Two key components of the recommended method are to:

1. reduce the scale of the transport modelling for many project permutations
2. standardise the BCRs to be reported.

The core steps within the method are to:

1. identify projects that may be interdependent with the candidate project(s)
2. group the projects:
  - a. for modelling and reporting purposes by the nature of their interdependence
  - b. by where they sit within the institutional planning process
3. phase the modelling of future project scenarios to gather the required information and to test whether further modelling would materially alter results
4. format multiple BCR reports to show the increasing uncertainty of each being attained, even though the actual level of uncertainty may be unknown.

## Advantages and disadvantages of the method

The method efficiently searches for and accounts for project interdependency and provides a transparent result to decision makers. However, the method relies on expert judgement at stages within the analysis. The range of BCRs reported still doesn't fully capture the range of possibilities.

It's contextual whether the complexity introduced into the analysis is an advantage or disadvantage. It is definitely more work for analysts and more information for decision makers to take into account, and this will improve decision making. Improved decision making can only be an advantage. However, where projects already have a robust business case, the additional information from the interdependency analysis may offer little added value to decision making.



RR 684 – Cost-benefit appraisal methods for interrelated and interdependent projects/schemes, Waka Kotahi NZ Transport Agency research report. Available at [www.nzta.govt.nz/resources/research/reports/684](http://www.nzta.govt.nz/resources/research/reports/684)