



Which analytical tools are suited to transformative change?

This document summarises a paper that considers which analytical tools are suited to transformative change.

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Highlights

The paper:

- is motivated by growing interest in policies aimed at addressing climate change and other long-term challenges and opportunities and related questions about which analytical tools are most suitable
- uses the term ‘transformative change’ to describe this focus on forward-looking and transformative policies involving changes to the structure of the economy
- finds that:
 - transformative change tends to involve deep systemic changes which unfold over a long time and have a distinctively non-linear pattern
 - given the complexity, risk and uncertainty involved in transformative change, it is challenging to assess the impacts of policy options in advance
 - relevant analytical tools include ones that reflect the features of transformative change – goal-oriented, future-focused, systemic, involving risk and uncertainty
 - cost-benefit analysis (CBA), while a valuable tool in many contexts, does not appear to be well suited to transformative change. This reflects CBA’s limitations in this specific context – a status quo bias, narrow focus, and tendency to underplay environmental and other non-market impacts
- implies that improving analyses about transformative change might involve broadening the toolkit and exploring newer/under-utilised analytical tools, weighting more heavily tools most suited to transformative change, and improving analytical capability.



Background

Addressing climate change will involve significant changes to where and how New Zealanders live, the infrastructure that is built, how people are transported around, what we produce and consume, and so on. Policy needs to shape and support this transformation in a way consistent with New Zealand's climate goals. Climate change and other long-term challenges and opportunities have led to a growing focus on systemic, forward-looking and transformative policies. This paper uses the term 'transformative change' as a shorthand for this type of policy focus and associated changes to the structure of the economy.

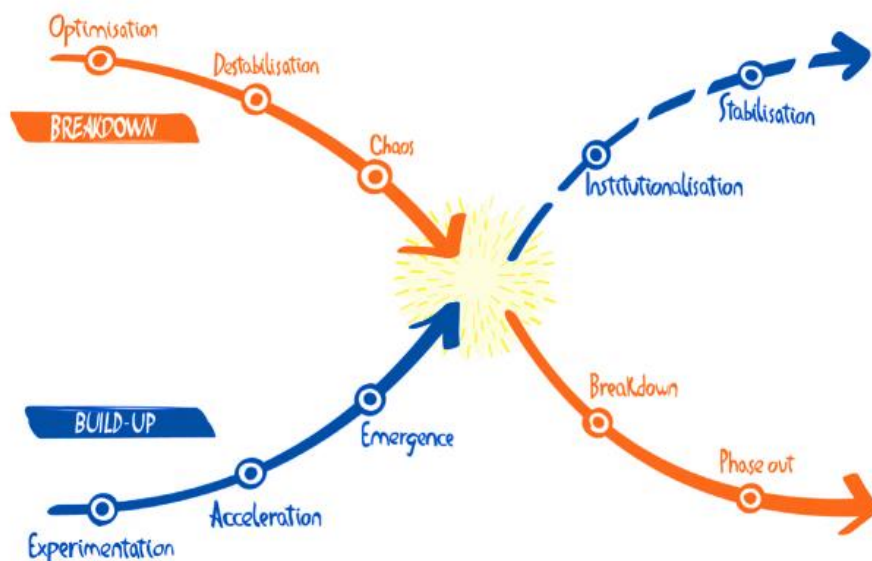
Questions are being raised, both internationally and in New Zealand, about which analytical tools are most suited to transformative change. In particular, the role of Cost-Benefit Analysis (CBA) is being debated. These questions provide the motivation for a paper which is available at www.mbie.govt.nz and is summarised here. The paper considers analytical tools that may help inform policy decisions in the early stages of the policy cycle about transformative change. The paper is based on a literature review and discussions with some New Zealand government agencies. The ultimate purpose is to stimulate debate about the selection of appropriate analytical tools and to support efforts to improve analytical capability.

What is transformative change?

'Transformation' is generally defined as a marked change in form or nature. The type of transformation discussed here involves change to the structure of the economy. This type of transformation is not new – the structure of the economy is always changing and has undergone periods of significant change in the past such as in the Industrial Revolution etc. What *is* new is the pace of structural change that is happening, or needs to happen, in response to anthropogenic climate change, biodiversity loss and other planetary stresses.

Transformative change involves long-term, complex processes which entail much risk and uncertainty. The process of transition from the current to future state can be described by two interrelated patterns: breakdown and build-up – see Figure 1.

Figure 1: X-Curve of transition dynamics



Source: Silvestri, Diercks, & Matti (2022), *X-Curve: A sensemaking tool to foster collective narratives on system change*

Innovation plays a key role in the build-up process depicted in Figure 1. But forces such as path dependence and vested interests work to preserve the status quo.

Policy can act as an enabler, set the direction of and shape transitions, and help avoid system failures. But achieving (and analysing) transformative change is hard. Transformative change involves action today in a world in which future preferences, risks and opportunities are unknown.

The features of transformative change as discussed here include:

- **Goal-oriented** – deliberate policy action towards specific goals.
- **Long-term and future-focused** – the future may look very different from the past.
- **Systemic** – involving widespread effects, and intervention points, across systems.
- **Risk and uncertainty** – the future is unknown and involves risk (which can be assigned a probability) and uncertainty (which cannot).
- **Innovation** – which is cumulative, highly risky, subject to occasional large discontinuous shifts and systemic.
- **Path dependence** – past events or decisions may constrain later ones; history matters.

Which analytical tools are suited to transformative change?

Table 1 below outlines some analytical tools that have been identified in the literature as relevant to transformative change. Essentially, these analytical tools respond to the features of transformative change discussed above – goal-oriented, future-focused, systemic etc.

When considering which analytical tools to use for policy about transformative change, it is important to note that there is no silver bullet. Each analytical tool has strengths and weaknesses. For example, Multi-Criteria Decision Analysis is often seen as a useful tool for option appraisal when impacts are not easily quantifiable. But Multi-Criteria Decision Analysis is often criticised for being subjective, lacking transparency and suffering from arbitrary weights. Similarly, Robust Decision Making is a tool which at first blush seems highly suited to transformative change, but this tool tends to be very time consuming and costly. Risk-Opportunity Analysis is attracting attention but is new and unproven.

Also important is recognising the risks, uncertainties and complexities inherent in transformative change. In such a context, it is challenging to assess the impacts of policy options in advance. Multiple tools, and ‘triangulation’ across a range of evidence and data sources, are probably needed to gain as full a picture as possible. Also important is a consideration of who has standing in the analysis. As well as the features of transformative change, tools should reflect Te Tiriti.

Partly in recognition of these challenges, some argue that particular attention should be paid to the strategic aspects of the policy process, such as the problem definition and intervention logic, case for change, and anticipated process of change. This reflects that a lack of clear problem definition at the strategic stage of the policy process means that any subsequent appraisal of policy options is likely to fail.



Table1: Analytical tools suited to transformative change			
Feature	Tool	Description	Relevance to transformative change
Goal-oriented (including unintended consequences)	Multi-Criteria Decision Analysis	Ranks options based on how well they satisfy stated criteria	Appraise policy options where impacts are hard-to-quantify/ monetise eg climate change policy
	Cost-Effectiveness Analysis	Identifies least-cost options for achieving a defined benefit/goal	Appraise policy options where there is a pre-defined goal eg reducing emissions
	Cost-Benefit Analysis	Quantifies the benefits and costs of a policy	Appraise policy options, esp where impacts are quantifiable/ monetisable
Long-term and future-focused	Scenario analysis	Describes alternative ways the future might unfold	Understand the future policy context
Systemic	System Dynamics	Models complex dynamic systems	Understand complex systems
Risk and uncertainty	Real Options Analysis	Per CBA but incorporates risk/uncertainty	Appraise policy options in the face of risk/ uncertainty eg large infrastructure projects
	Portfolio Analysis	Analyses portfolios based on risk/return etc	Appraise a range of policy options in combination
	Robust Decision Making	Analyses multiple strategies over multiple future scenarios	Appraise policy options in the face of risk/uncertainty
	Risk-opportunity Analysis	Assesses the risks and opportunities of a policy	Appraise policy options in the face of risk/uncertainty
Innovation	See tools in 'systemic' and 'risk and uncertainty' rows		

Source: Author based on various studies included in the paper

How well suited is cost-benefit analysis to transformative change?

Cost-benefit analysis (CBA) is used to appraise policy options, and is based on individuals' willingness-to-pay for a benefit and willingness-to-accept a cost. Benefits and costs are generally revealed through markets with money being used as the main metric. If benefits exceed costs, the policy is potentially worthwhile.

CBA has a number of strengths, including that it is a well proven and systematic tool, uses a common metric (money), and takes account of unintended consequences. CBA can be applied in many contexts and is generally seen as the dominant analytical tool in the policy toolkit.

In New Zealand, CBA is used for budgetary purposes, in major regulatory changes and elsewhere. However, the use of CBA is patchy and compliance is low. Some New Zealand agencies have undertaken CBA for many years, for example, in the transport sector. But in other agencies the use of CBA is more limited and/or more variable. Discussions with New Zealand agencies revealed wide-ranging perspectives, and deeply-held views, on CBA and other analytical tools.

To help New Zealand agencies conduct CBAs, Treasury has developed the bespoke CBAX tool – a spreadsheet model with a database of values to monetise impacts. CBAX guidance includes some material relevant to transformative change, including the use of sensitivity analysis and ranges to help deal with risk and uncertainty. However, the default discount rate is 5% which is at the high end of the spectrum, and, unlike many countries, New Zealand does not have a separate (lower) discount rate for long-term investments. This works against policies with long-term benefits.



Despite its general applicability, CBA has major limitations regarding transformative change:

- **a status quo bias**, for a number of reasons including through the use of discounting
- **a tendency to underplay environmental and other non-market impacts**; such impacts may be the very goal of transformative change
- **a narrow focus in general**, which may fail to identify the potential of a sum of multiple projects to collectively achieve transformative change.

Some New Zealand and overseas studies identified CBA's limitations in the context of climate change. Discounting may distort the appraisal of climate policies whose benefits tend to accrue over long timeframes. The benefits from emerging clean technologies and other innovations may be particularly hard to estimate. Environmental impacts are also hard to aggregate; a wide range of biophysical, monetary and socio-cultural indicators are available, but these indicators are challenging to combine. While a CBA may include non-monetised and qualitative information, this information may not be seen by decision-makers on a level footing to 'hard' monetary or quantitative data.

Some techniques are available to make CBA more suited to transformative change. However, these techniques tend not to be used much in practice, and some question the extent to which they overcome CBA's core limitations in the context of transformative change. CBA seems ill-suited to situations where fundamental relationships in the economy might be changing. CBA is more concerned with static efficiency (the efficient allocation of resources at a point in time), whereas transformative change is more concerned with dynamic effectiveness (achieving a goal over time).

Therefore, analysts might want to question whether CBA is the most suitable tool in the toolkit when the goal is transformative change.

Conclusions

Improving analyses about transformative change might involve broadening the policy toolkit. While CBA may be used to appraise policy options, other analytical tools may be more relevant to option appraisal in this context. And other tools may be relevant to other early parts of the policy cycle about transformative change, such as tools which help imagine alternative plausible futures, understand complex systems and assess risk and uncertainty. These tools could be upweighted.

Greater long-term investment in analytical capability might be needed for policymakers and analysts to become more familiar with, and possibly use, new or under-utilised tools. This investment reflects that analysing transformative change is challenging, analytical capability in New Zealand has been found to be limited, selecting the right tool for the job requires knowledge of diverse tools, and perspectives on specific tools are deeply held and may be hard to shift. There is no quick fix to building deeper analytical capability.

However, there may be some shorter-term opportunities to improve analyses about transformative change. These opportunities include developing analytical tools that better reflect te ao Māori – a recognised gap. They also include lowering discount rates in CBAx guidance and/or introducing a separate discount rate for long-term investments as used in many other countries, to prioritise future impacts.

Read the full version of the paper at www.mbie.govt.nz or call us on 04 901 1499.