

“Additionality”: How will we know the National Science Challenges are making a difference?

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by Professor Sally Davenport

Many of us in the innovation system have been hearing this ‘additionality’ word a lot recently. For some it’s an odd term they have never heard before and, relative to many words, it is a youngster.

It apparently first surfaced in the 1950s as a concept in economics.

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The Oxford Dictionary defines it as: *the fact or concept of being additional; especially any principle or policy that involves pursuing economic or financial practice according to this concept*. In plain(er) language, it is the extra value generated by a policy intervention over and above what is already happening. And it’s notoriously hard to measure[1]!

Yet it’s a core plank of the National Science Challenges (NSCs) – the potential for which helped the eleven challenges achieve their status. In 2013 the NSC Panel argued that additionality was evident enough to establish a challenge approach “*where additional research, progress, and impact can be generated by collaborative research*”[2]. Thus those of us involved in NSCs will need to demonstrate that we are generating additionality to be deemed successful up to and beyond 2019.

The MBIE NSCs website asks[3]: “*How are the National Science Challenges different from other MBIE investment processes?*” Their answer states: “*The National Science Challenges are significant mission-led investments that focus on defined issues of national importance. Each Challenge encourages proposals from New Zealand’s ‘best team’ and looks for additionality, e.g. new ways of doing things in terms of scientific approaches, collaboration between researchers, disciplines, and research organisations, and new ways to manage research activities*”. In the NSC MBIE performance framework, additionality is said to be demonstrated when the Challenge “*funds a coherent set of projects rather than disparate projects*”.

Additionality – what does it mean?

Additionality is common parlance around R&D subsidies to firms but also increasingly in environmental and climate change interventions. Three different types of additionality are usually described: input, behavioural and output additionalities[4]. Input additionality, in the case of firms, is when they increase their own investment in R&D as a result of public funding. In the NSCs, we might observe input additionality either by seeing increased alignment and cross-fertilisation between our research and other funded programmes, or when we attract co-funding or in-kind support from other sources.

Output additionality covers the direct outputs of the intervention – which can be in increased scale/quantity, enhanced quality, results achieved in an earlier time-frame, or more benefits targeted to a specific group. Typical innovation project outputs are patents and publications, new start-ups or products. Outputs are measured assuming they represent an intermediate step to the policy’s desired outcomes which, in the case of the Science for Technological Innovation (SfTI) challenge is more technologically driven economic growth. As we well know, there is often a delay between investment and outputs, and an even longer, and more tenuous, casual path to outcomes. But that shouldn’t stop the NSCs keeping our sights on those outcomes.

Behavioural additionality (sometimes called second-order additionality) is an intermediate form that is really important for the SfTI challenge. It encompasses individual and organisational learning and beneficial process change that arise from participating in a policy scheme. Years ago a master’s student studied the additionality evident from a NZ policy intervention called the Technology for Business Growth scheme[5]. She found that even though some input and output additionality was (inconsistently) evident, the most benefit came from the businesses having to fill out what was effectively a business plan in order to be eligible (even though they complained bitterly about it at first). Longer term, this planning behaviour served the firms well as a new or enhanced organisational skill.

SfTI’s mission includes behavioural additionality as we aim to enhance New Zealand’s capacity to use physical sciences and engineering for economic growth. SfTI’s particular focus on building not just technical, but also the human and relational capacity of our researchers, is why we are doing more than just funding research projects. It is why, for example, we work with others, such as Kiwinet, to provide commerciality oriented learning opportunities for our research community. It is why we have been developing new collaborative processes between researchers and industry/Māori leaders to define and build new mission-led ‘best NZ team’ spearhead projects. It is why we also have our theme leaders mentoring the lead researchers of our 28 seed projects. These processes can be more time-consuming than a traditional approach but it is our hope that, if (when) proven beneficial, they will become ‘business as usual’ for our wider research community.

That other meme – impact

You might well ask, is this additionality concept any different from generating impact, another meme in our research world? In MBIE’s recently released discussion paper[6], impact is defined as “the final, long-term effect in a causal results chain” from a science investment, which sounds remarkably like outcome additionality. The subtle difference is that additionality is meant to take into account the counter-factual of no investment. A simple formula describes the link between additionality and impact:

$$A = I_{in} - I_{rc}$$

where A is the additionality, I_{in} is the impact of the intervention, and I_{rc} is the impact of a reference case or baseline. It is clear from the MBIE website that the reference case for the challenge is MBIE (or equivalent) investment processes.

So is SfTI making a difference? As we approach our second year anniversary since the challenge was launched on 16 September 2015, it is a question we will be asking a lot more in coming months leading up to our mid-term review. Thanks to all of you that have helped

us so far with our experiments with new ways of developing and managing edgy mission-led research. Thanks to you, SfTI will be able to tell a strong additionality story on many dimensions.

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[1] For the UK Treasury's guide:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf

[2] <http://www.pmcsa.org.nz/wp-content/uploads/Report-of-National-Science-Challenges.pdf>

[3] <http://www.mbie.govt.nz/info-services/science-innovation/national-science-challenges/features#3>

[4] Clarysse, B., Wright, M., & Mustar, P. (2009). Behavioural additionality of R&D subsidies: A learning perspective. *Research Policy*, 38(10), 1517-1533;

[5] Davenport, S., Grimes, C., & Davies, J. (1998). Research collaboration and behavioural additionality: a New Zealand case study. *Technology Analysis & Strategic Management*, 10(1), 55-68

[6] <http://www.mbie.govt.nz/info-services/science-innovation/national-statement-science-investment/science-impact-discussion-paper-june-2017.pdf>