NZTE's Output Class 2 – Sector Activities

Evaluation Report

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Glossary[1]

Additionality

Additionality refers to the 'additional' outcome or difference that has occurred through an intervention. Additionality is concerned with what would have happened without the intervention, and can take into account the costs of the intervention. This is of interest in considering the impact of government intervention – what difference has the intervention made? In an economic context, what difference did taxpayer funds make, rather than subsidising private benefits? What would have happened anyway without the government intervention?

Effectiveness

Effectiveness measures whether an intervention has produced its expected outcomes or establishes the reasons why it has not been able to do so. Effectiveness can also be concerned with the causality of any changes in the target groups (the effect) as a result of the intervention. One way of illustrating the cause and effect relationship is through a logic diagram or table. Effectiveness does not take into account any costs.

Efficiency

The term efficiency can have many different meanings. In evaluation, it refers to the resources used by a programme to deliver its outputs. An efficient programme would have a low ratio of costs or resources to outputs, or a higher ratio of outputs to costs or resources. One way of measuring efficiency is to compare the costs of its activities with those of similar programmes aiming to achieve the same or similar results.

Opportunity Cost

This describes the cost of not putting resources into other areas. Opportunity cost measures the cost of the alternative uses of resources (and their benefits) that must be foregone in order to pursue the desired activity.

Value for money

A value for money assessment is compiled by combining the results of examinations into efficiency, effectiveness, additionality, opportunity cost, impact, and the value achieved by a programme for the money spent. Value for money also sometimes incorporates aspects of 'economy', that is, securing goods for the least possible cost.

Intervention Rationale

Government intervention generally occurs where there are factors preventing the market from carrying out its role unaided, as markets may not always be able to

[1] The definitions offered here are intended to convey the meaning of these key terms in accessible language to a lay audience. They are not intended to be read as dictionary definitions.

produce the most efficient outcome. Under certain conditions, government intervention can increase general welfare. Where that is the case, government has to correctly identify the issue and devise actions with which to address it. This is termed government's rationale for intervening. The most frequent rationales for government intervention are market and regulatory failures, or to achieve certain desired social outcomes

Market Failure

This term refers to situations in which the market on its own does not deliver the most efficient outcome. Government intervention may then be able to achieve a more efficient outcome. The most commonly identified market failures in economics literature that relate to sector support programmes similar to Output Class 2 are:

- *Spillover benefits* – We define spillover benefits, such as knowledge spillovers, as those that flow to the wider sector or industry as a result of a particular intervention. Spillover benefits exclude any benefits that accrue directly to the recipient company (ie increased sales, exports or productivity) or flow-on benefits to companies or individuals as a result of the intervention. Spillover benefits would include the generation of new knowledge and skills which are eventually available to companies in an industry or the wider economy.

- *Coordination failures* – The development and use of new technologies may require coordination of investment and production between entrepreneurs. This is an example of a coordination failure where the coordination will not occur if left to the private sector alone.

- *Agglomeration externalities* – These refer to the spillover benefits resulting from agglomeration (ie groups of related firms clustering together or locating near one another). According to Marshall, agglomeration produces higher productivity due to three reasons: labour market pooling; supplier specialisation and knowledge spillovers.

Regulatory or Government Failure

A regulatory failure, or government failure, occurs when government intervention leads to a more inefficient outcome than without it. This may be because the costs of regulations or interventions outweigh the benefits they produce. The idea of government failure is associated with the policy argument that, even if particular markets may not meet the standard conditions of perfect competition required to ensure social or economic optimality, government intervention may make matters worse rather than better.

Executive Summary

This evaluation assesses the performance of New Zealand Trade and Enterprise's Output Class 2 (OC2): Regional and Sector Development Services. The output class has evolved over time, and its main aim since 2008/09 is to provide 'advice and support...for the development of regional development strategies, and …to improve the performance of sectors'.

OC2 has an annual budget ranging between $31-47 m and consists of a number of heterogeneous programmes, including Strategic Initiatives, Sector Projects, Better By Design, and whole of government initiatives such as the Food and Beverage taskforce.

Findings and conclusions

Sector development programmes have the potential to add economic benefit for New Zealand under certain conditions, and economic literature supports this view. However, some sector problems may not require government intervention, or may not be cost-effective for government to address.

Effective sector programmes should be able to provide an additional benefit that arises from the government intervention (additionality), that wouldn't have occurred otherwise, and provide wider benefits to sectors (spillovers) beyond the benefits received by individually targeted firms. Focusing activities on market failures, such as spillovers, allows government to demonstrate additionality for its investment in programmes, rather than simply subsidising private benefits to firms.

NZTE's OC2 activities generally reflect areas of economic priority to government, and are aligned with targeted sectors of interest. NZTE has received guidance from Ministers[2] on sectors to target and has aligned its activities with these areas. OC2 activities have in general contributed strongly and sometimes exclusively to firm specific benefits, such as international firm growth. Client feedback on NZTE offshore assistance has been predominantly positive.

Our analysis has found some examples of demonstrable wider sector benefits occurring as a result of OC2 activities. Where we have found specific and valuable examples of demonstrable wider sector benefits arising from OC2 activities, these are highlighted in our report. For example, NZTE has undertaken valuable work supporting industry associations, facilitated networking and sharing of knowledge amongst some sectors, and facilitated some beneficial collaborations.

However, the full range of OC2 activities have generally not focused sufficiently on the additional benefits, including spillovers, of activities to sectors. The impact and value for money from OC2 interventions is therefore difficult to establish. A number of programmes are not backed by sufficiently robust intervention rationales, objectives and success criteria, which results in difficulty ascertaining the reasons for government intervention through NZTE's sector activities.

[2] Giving Effect to Areas of Focus to support economic transformation POL 07 337.

NZTE's other output classes, including Output Class 3 and 4, provide activities to promote international growth and development opportunities for individual firms, and there is some overlap between these and the activities provided in OC2. NZTE's activities in these other output classes are appropriate for the objectives of those output classes. However, individual firm growth is not the intended focus for Output Class 2, where wider sector benefits are intended.

While NZTE has achieved the majority of its performance measures for the output class, the current performance measures for OC2 activities do not give a clear indication of progress towards achieving sector wide benefits. A small of number of NZTE's performance targets have focused on more valuable sector outcomes, but NZTE has been less successful at achieving progress on these.

Insufficient involvement by the Ministry of Economic Development (MED), and expertise in identifying where government involvement could improve on market outcomes, has resulted in a less effective outcome for OC2 activities. Delegated responsibility to NZTE for high level strategic decision-making and defining policy problems has resulted in a relative lack of thorough sector knowledge on which to base policy interventions.

The financial and staff resources used to provide activities in OC2 were difficult to establish. Some of the funding for this output class relates essentially to activities in other output classes, making them appear more efficient than they are, and OC2 less efficient. The financial and staff resources for OC2, and other output classes, need to be more transparent.

Recommendations

We recommend that:

1. A process is agreed among agencies to resolve the substantive issues identified in this evaluation;

2. Further work is undertaken to identify the most effective balance of responsibility between MED and NZTE for developing and implementing sector policy, including developing intervention rationales, objectives, success criteria and sunset clauses;

3. Sector activities are re-designed to specifically and explicitly provide the types of intended sector wide benefits highlighted in our report;

4. Better evidence and analysis is gathered to underpin the nature and extent of the sector problem that government should address, including the appropriate level of government intervention; and

5. Further work is undertaken to clarify the transparency of financial and staff resources in Output Class 2, and other output classes.

1. Introduction

Chapter 1 provides an overview of:

- the scope and objectives of this evaluation
- the evaluation methodology
- NZTE Output Class 2, including its underlying policy rationale, objectives, and funding.

1.1 Background and objectives

This evaluation is part of an agreement between the Ministry of Economic Development and New Zealand Trade and Enterprise to evaluate all six NZTE output classes. In addition to this full evaluation report, a Summary Report is also available and is aimed at summarising the main findings and conclusions of the evaluation for key decision makers. The full evaluation report presented here contains additional detailed information and is intended as a reference document in support of the Summary Report.

The purpose of this evaluation is to assess the efficiency and effectiveness of the projects and initiatives that are delivered through Output Class 2: Regional and Sector Development Services. This involved examining:

- the underlying rationale for programmes and policy
- the costs and resources used to deliver programmes
- whether objectives have been achieved
- the net impacts of OC2 programmes
- what would have happened without the public intervention (additionality).

The evaluation was conducted by the MED Evaluation Team, supported by a Working Group and a higher level Reference Group. The Working Group brought together officials for NZTE and MED who closely accompanied the evaluation, while the Reference Group provided overall guidance at crucial stages during the process.

The findings and conclusions of this evaluation feed directly into ongoing policy priorities such as the Economic Growth Agenda and will inform future government sector policy.

1.2 Scope of evaluation

This evaluation analyses the impact and cost-effectiveness of NZTE OC2 activities. Impact is measured by additionality. In other words, what has happened that would not have happened without the public intervention? This also includes a stocktake and assessment of the underlying rationales and opportunity cost considerations.

Cost-effectiveness refers to the efficiency with which Output Class 2 programmes and services are delivered.

This evaluation also reviews the policy advice developed by MED, and the support ministers and NZTE have received from MED, for example, in the form of an underpinning sector policy to support economic growth.

In addition, the evaluation examines the engagement between MED and NZTE on policy programmes, and how NZTE learnings and experience have translated into policy changes. For programmes that have been terminated, the evaluation looks at the reasons for that and examines the evidence base on which those decisions were taken. However, activities affecting sector and sector policy by other government departments and crown agencies, except for MED and NZTE, are not covered in this evaluation.

The main period of focus is 2006-2009, not least due to the fact that a previous evaluation in this area was carried out in 2006. Where it makes sense to go back further in time, for example to have a more robust time series of information or for programmes that the 2006 review could not evaluate due to a lack of information at the time, it is within the scope of this evaluation to do so.

1.3 Evaluation methodology

An essential part of analysing the effectiveness of Output Class 2 is to consider what has happened as a result of OC2 that would not have happened otherwise (ie the additionality). An analysis of the impacts of an intervention should address this question. Impacts that would have happened anyway should not be attributed to the intervention.

A second important aspect of evaluation concerns the cost at which the services (or impacts) are delivered, that is, the efficiency of delivering the programmes. Combining findings on effectiveness and efficiency with appropriate benchmarks allows for an assessment of the value for money of government's investment.

Quantifying the costs and benefits of an intervention would allow us to calculate the rate of return that the intervention produces. Unfortunately, in reality there is often detailed information on the direct costs of the intervention available, ie the financial costs, but only limited data on its benefits. Moreover, much of the benefit information is likely to be qualitative rather than quantitative. This is the case for many OC2 programmes.

The methodological approach chosen for this evaluation is a pragmatic one: where quantitative information exists, we use quantitative tools such as econometric analysis. For the majority of projects and initiatives there is little or no quantitative data available and we used a qualitative, case study based approach.

The evaluation methodology involved the following steps.

1. Step One – A literature review. We undertook a review of the relevant literature on sector support, including a review of what schemes and programmes exist in other countries. We also commissioned a consultancy,

Infometrics, to review our method for the evaluation and to outline economic thinking on governments' rationale for sector support programmes[3].

2. Step Two – Descriptions of the initiative or project and the reasons for intervention. While market and coordination failures play a key role, we do not ignore the limitations of these justifications for public intervention and include opportunities based on business cases and ex-ante net economic benefit calculations in this step. This part of the analysis also investigates whether the passage of time has affected validity of the underlying rationales. The information needed for this part of the evaluation is sourced from interviews with policy managers; background documents such as reviews, policy papers, cabinet papers and NZTE board papers; and findings from the literature review.

3. Step Three - Analysis of impacts. Where quantitative data is available (eg Better By Design) we combine econometric analysis, evidence from existing reports, and findings from interviews and surveys, to assess a programme's effectiveness and additionality. For those programmes that have little to no information on their impacts, analysis is based on a triangulation of evidence from various sources, including feedback from clients, interviews with key stakeholders and programme providers and NZTE managers, and findings from international literature on programmes from other countries. The analysis of the impact of OC2 draws on existing reports and reviews of its constituent programmes. Where there is a lack of quantitative evidence we pay particular attention to the underlying rationales, or the basis on which decisions were taken if programme changes have been made.

Measuring spillovers

The evaluation aimed to identify spillovers from NZTE's OC2 activities. We define spillover benefits as those that flow to the wider sector or industry as a result of the particular NZTE programme engaged in by firms. Spillover benefits exclude any benefits that accrue directly to the recipient company (ie increased sales, exports or productivity) or flow-on benefits to companies or individuals as a result of the NZTE programme. Spillover benefits would include the generation of new knowledge and skills which are eventually available to companies in an industry or the wider economy to increase their competitiveness. Spillover benefits would not include more employment or demand for the goods and services of local providers as a result of the NZTE activity.

Firms involved in OC2 activities were asked a number of questions to identify what individual benefits they had received as a result of the NZTE OC2 activities, and whether they had passed on a range of possible wider benefits to other firms either in the sector or those not directly engaged in activities[4]. Firms were prompted on whether there had been any wider benefits as a result of the NZTE activity, including the following.

[3] This report is available separately.

[4] See Appendix 2 for a list of the interview questions.

- Generating new skills or business models as a result of the activity.
- Passing on new skills, knowledge or business models to other New Zealand firms in the sector as a result of the activity.
- Engaging in collaborations facilitated by NZTE that would not have occurred otherwise.
- Engaging in networking and knowledge-sharing activities facilitated by NZTE.

In general we were not able to measure spillovers quantitatively or econometrically. However, where quantitative information was available, it was used to give an indication of the likelihood of spillovers occurring. We also examined the intervention rationales of programmes to identify whether in theory spillovers could be expected from the activity or intervention.

Our findings are based on interviews with firms and industry organisations, the latter whom have interaction with large numbers of firms, who are both involved and not involved in NZTE activities. Although the number of interviewed firms and industry stakeholders (around 40) is not statistically robust, most of the firms were recommended to us by NZTE to ensure a good sample of the different types of activities and firms engaged in OC2. We asked NZTE to identify firms to be interviewed to examine whether OC2 activities had led to wider sector benefits being passed on to other firms. NZTE also provided case studies, and other material, which have contributed to our findings for the evaluation.

In general, there is some consensus that measuring the extent of spillover benefits comprehensively can be difficult. However, we consider our findings across the evaluation, based on triangulation of a variety of evidence, to be a fairly robust picture of the likely outcomes of current OC2 activities.

1.4 Overview of Output Class 2

Output Class 2: Regional and Sector Development Services provides '*customised advice and support to regional institutions for the development of regional economic development strategies, and to sectoral industry bodies and groups of firms to develop and implement plans to improve the performance of sectors*' (NZTE SOI 2009-12).

Output Class 2 is divided into Output Class 2.1: development of institutions and capability at a regional level, and Output Class 2.2: development and leadership of growth strategies at a sector level.

Output Class 2.1 includes administrative costs associated with projects funded under the Regional Strategy Fund, support for sectoral industry bodies and regions, and the Enterprise Culture Skills and Activities fund.

Output Class 2.2 comprises mainly sector initiatives, sector projects, Better by Design, GIF sector initiatives, projects arising from the Food and Beverages Taskforce and a number of other initiatives such as Lean Business, Manufacturing

Plus and Futureintech. Table 1 shows an indicative financial breakdown of the Output Class since 2006-07.

Table 1: Financial breakdown of directly allocated costs in Output Class 2 since 2006-07

	2006 -2007		2007-2008		2008-2009		2009-2010
	FY Actual		FY Actual		FY Actual		Forecast[5]
Sector Projects	5,951		3,538		3,900		4,976
Strategic Initiatives	0		5,612		6,520		5,422
F&B Taskforce	0		2,672		5,037		5,734
Others							
Offshore Scoping Projects	585		1,156		1,000		852
Enterprise & Innovation	581		100		460		0
America's Cup (sector only)	1,884		139		0		0
Connect NZ	493		424		0		0
China FTA (MFAT)	0		644		203		0
Other (incl. Sector Balance/WIP)	0		0		0		0
	3,543		2,463		1,663		852
Total Sector/SI/F&B Taskforce/Others	9,494		14,284		17,120		16,983
Total GIF Sector Initiatives	4,436		6,846		6,282		5,360
Total	13,930		21,130		23,402		22,343
Unallocated and Other Costs	n.a		31,552		22,554		24,977
Grand Total	n.a		**52,682**		**45,956**		**47,320**

Source: NZTE

Policy objectives[6]

Establishing a comprehensive rationale and set of objectives for all the various projects and services delivered under the umbrella of Output Class 2 by necessity involves a degree of generalisation. Project or programme specific rationales and objectives are dealt with in relevant chapters in this report.

NZTE targets sector services at growth sectors in which New Zealand has a comparative or competitive advantage. Growth in these sectors may already be reasonably robust, but NZTE sector programmes would aim to overcome certain constraints preventing sectors from realising their full potential.

[5] Financial information provided for this evaluation is current to June 2010.
[6] The logic model underpinning OC2, including its outputs and expected outcomes, immediate, intermediate and ultimate, is shown in Appendix 3.

The Overview Review of NZTE Sector Facilitation Activity, MED 18 January 2007, summarises the following rationales and objectives.

- The overarching goal of sector facilitation policy is to select and influence those sectors where improvements in their productivity are likely to result in improvements in the NZ economy.
- To strengthen connections within sectors and create stronger direction for sector development
  - To improve collaboration within sectors
  - To identify sector-wide development issues and opportunities.
- To increase capabilities within sectors
  - To improve productivity
  - To improve ability to adopt new technologies or business models.
- To help sectors take advantage of significant international market opportunities
  - To improve capabilities within sectors for developing global connections
  - To improve collaboration and scale among NZ firms and sectors.
- To enhance coordination of sector support across government.

Sector services may be targeted at an individual sector or cross-sectorally, for example by strengthening links between sectors. Output Class 2.2 consists of activities aimed at helping firms within a sector as well as exploiting cross-sectoral opportunities.

NZTE's objectives for strategic initiatives

NZTE outlined its intention to implement strategic initiatives in its Statement of Intent 2007-2010. NZTE identified areas where there was potential for growth or where New Zealand had a competitive advantage or particular expertise. NZTE's aim was to assist firms and sectors to develop strategies to respond to global trends and to work with other partners to ensure the environment supports these strategies. NZTE's Statement of Intent outlined that the activities are focused on:

- supporting collaboration
- linkages and development of strategies between and among sectors.

NZTE selected several areas for strategic initiatives, identifying specific outcomes to focus on. Table 2 shows the outcomes NZTE expected to achieve across the strategic initiatives.

Table 2: NZTE's expected outcomes and three-year results outlined in its Statement of Intent 2007-2010

Strategic Initiative	Outcome area	Expected Three-year result
Creating Value from the Primary Sector	Increased use of new technologies to support the commercial activities of New Zealand food companies in international markets	Increased numbers of farms adopt on-farm efficiency technology modules
	Increased number of New Zealand businesses using consolidated channels	Increased number of New Zealand based companies operating in North Asia and North America
	Increased consumer awareness and increased acceptance of New Zealand products	Generate increased business from increased market penetration by New Zealand food companies
Entertainment – Content Driven Experience	Contribution of this area to New Zealand's economy	Increase in net economic benefit beyond what would occur otherwise
	Increase in new foreign direct investment	$500 million additional finance raised from foreign investors
	Increased number of businesses entering new international markets	40 additional businesses will enter new international markets
Designer Lifestyle	Contribution of this area to New Zealand's economy	Increase in net economic benefit beyond what would occur otherwise
	Number of businesses entering new international markets	30 additional businesses will enter new international markets
	Number of businesses engaged in self-sustaining collaborative partnerships	20 businesses will be engaged in self-sustaining collaborative designer led partnerships
Globalisation of New Zealand technology	Developed industry vision to focus activity	Facilitate development of one significant new technology area for commercial engagement
	Stimulate industry collaboration	Joint industry and NZTE agreement on three strategic areas of focus for major emerging technology initiatives for future development
		Industry collaboration mechanisms are established in three specific emerging technology sub-sectors
Global transformation of the	NZTE facilitates growth in the manufacturing sector, leading to	A defined segment of New Zealand's top manufacturers

Strategic Initiative	Outcome area	Expected Three-year result
Manufacturing Sector	increased net economic benefit	review their business models based on the Manufacturing Plus model
		60 manufacturing businesses make significant changes to their business operations as a result of the Manufacturing Plus programme and associated NZTE initiatives
		NZTE facilitates the implementation of three manufacturing sector growth plans
Integrated Healthcare	Increase health industry capability	At least three collaborative health projects facilitated by NZTE
	Increase international connections	At least 20 New Zealand health technology companies have made significant progress internationally
Sustainability	No outcomes set	

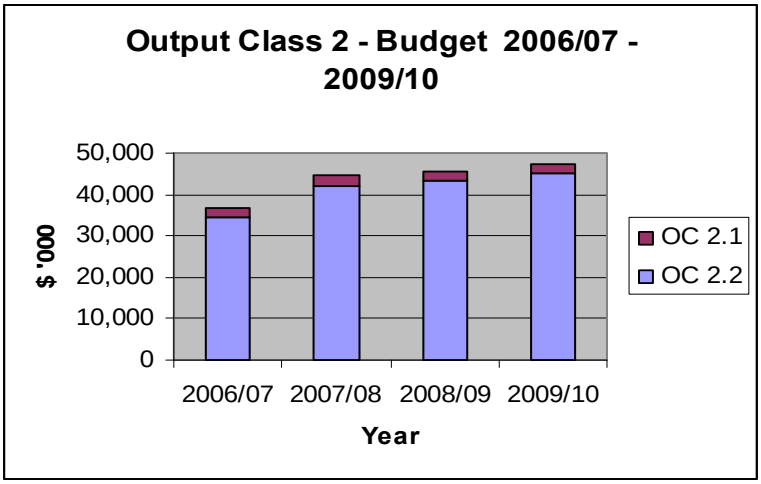
NZTE revised the focus of its strategic initiatives in 2009, reducing their number to three. NZTE's Statement of Intent 2009-2010 outlines that NZTE undertakes strategic initiatives and sector projects because they yield a mix of direct and indirect benefits: direct benefits to participating firms, and indirect benefits to sectors and/or the national economy. Benefits may be the actual dollars generated, but there can also be other spillover benefits to the wider economy such as jobs created or technology transfer.

It is these wider benefits and spillover benefits that we have looked for in this evaluation, in order to identify the value for money of NZTE's Output Class 2 activities.

Output Class 2 funding

The budget for Output Class 2 activities has increased from $36,557 m in 2006/07 to $47,320 m in the current financial year (2009/10). The vast majority of this money is spent on Output Class 2.2. The funding for Output Class 2.1 has slightly decreased from $2,517 m in 2006/07 to $2,128 m in 2009/10.

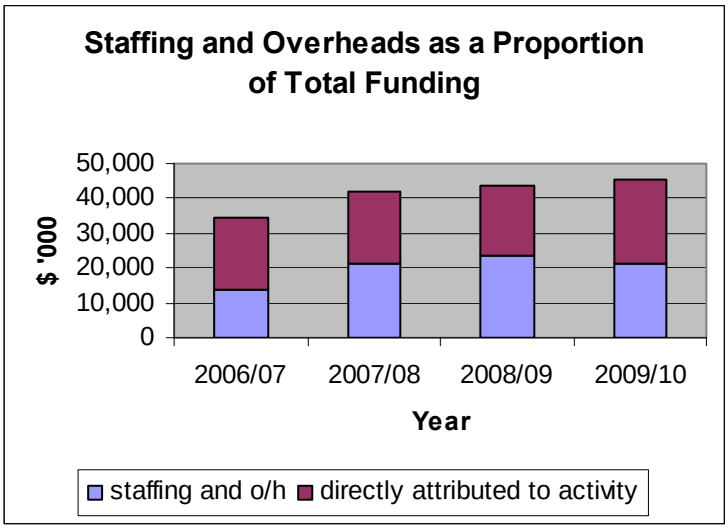
Figure 1



A significant proportion of the increase in the funding is for implementing the recommendations of the F&B Taskforce in 2007/08. It appears that sector initiatives also account for some of the increase in the total funding, although, as expected, the majority of their funding has come from sector projects.

The following diagram divides the total funding for Output Class 2.2 into that for staff and overhead costs and that which has been directly spent on projects and initiatives. This information is to the best of our knowledge and based upon the information available to us at the time of writing this report. It shows that approximately half of the funding for Output Class 2.2 is spent on funding staff and overhead costs, with the other half used for directly funding activities within this output class[7]. We believe that the majority of Output Class 2.1 funding is used for staffing and overhead costs.

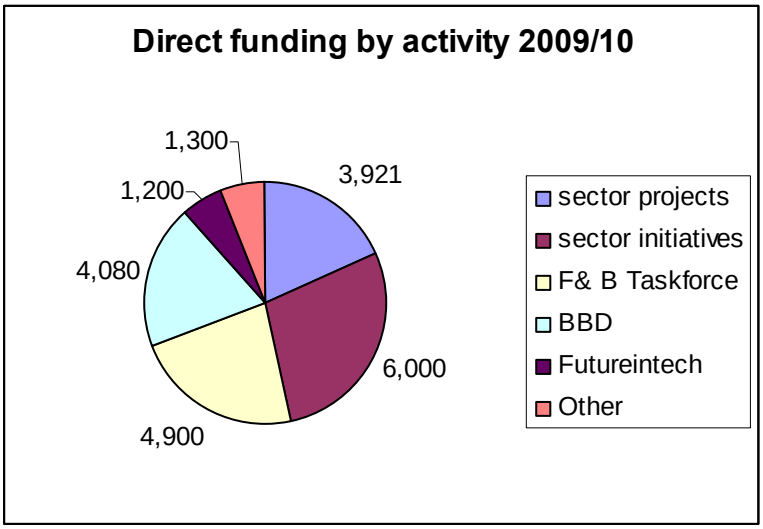
Figure 2



[7] The latter includes staff who work full time in this area, purchase of services and facilities (eg trade pavilion) and co-funding firms and sector organisations.

Dividing the direct funding up between the various activities shows that approximately half of the direct funding is spent on sector projects and sector initiatives. The Food & Beverage taskforce and Better By Design account for a further significant proportion of the funding, with the remainder going to Futureintech and some other activities.

Figure 3



The staffing and overhead costs between 2006/07 and 2009/10 are shown in Table 3 below:

Table 3: Funding for staff and overheads 2006/07 – 2009/10

2006/07	2007/08	2008/09	2009/10
20,341	21,069	19,995	23,771

NZTE has estimated that the number of FTEs funded from Output Class 2 is around 130-140. The absence of a full costing system capturing the time NZTE staff spent on the various output classes means that this figure has had to be estimated. It appears that this figure is in proportion to NZTE's total funding and total number of employees.

One third of the number of FTE funding is funding for senior staff and corporate support. Unfortunately, we do not have NZTE staff and overhead costs for each of the activities (initiatives and projects) in Output Class 2 that would allow us to calculate their full costs.

1.5 Structure of the report

The remainder of this report is organised as follows.

Chapter 2 provides an overview of the policy context for this evaluation, including a discussion of rationales for government intervention and a review of the literature on sector support/industrial policy, particularly international evidence in this area.

Chapter 3 summarises the findings of this evaluation on regional activities delivered through Output Class 2.1.

Chapter 4 presents findings on strategic initiatives delivered through Output Class 2.2.

Chapters 5, 6 and 7, more specifically, present findings on each of the three strategic initiatives: the Emerging Technologies Initiative (Chapter 5), the Health Strategic Initiative (Chapter 6) and the Primary Sector Strategic Initiative (Chapter 7).

Chapter 8 presents findings on sector projects.

Chapter 9 reports findings on sector programmes.

Chapter 10 discusses the main findings and conclusions of this evaluation. It also presents the key recommendations arising from the evaluation.

2. Policy Context and Literature Review

This chapter includes discussion of:

- sector policy and sector development policy in New Zealand
- rationales for government intervention
- the literature on sector support/industrial policy, particularly international evidence in this area.

2.1 Policy context

Basis of sector policy

Over the years governments' attempts to influence the growth rate of the New Zealand economy have included a focus on enhancing the export capabilities of New Zealand based businesses through improving their (international) competitiveness. Policies aimed at picking winners by protecting or subsidising individual firms have often failed in the past, both in New Zealand and abroad. Targeting sectors allows government interventions to focus on wider systemic issues such as market failures and ensures that the benefits of competition at the firm level are not foregone. The emphasis on sectors has been a long standing policy in most, if not all, OECD countries and economic areas such as the EU and ASEAN.

History

Sector policies in New Zealand have evolved over the past decade. Industry New Zealand (Industry NZ) had been involved in a number of sector engagement activities since about 2000. In 2002 sector engagement was chosen as one of the cornerstones of the Growth and Innovation Framework. Industry NZ examples of sector engagement include the strategy for the transformation of the textiles, clothing, footwear and the carpet sector (TCFC) in 2002 and ICT, biotechnology, design and screen GIF taskforces in 2002-2003.

When NZTE was established in 2003 with the merger of Industry NZ and Trade NZ, it inherited this sector engagement work from Industry NZ. NZTE was tasked with further exploiting '*opportunities for growth and to minimise barriers to growth for groups of complementary firms. Targeted sector support may include the facilitation of sector strategies… The services may also encourage sectors to identify the benefits of collaboration on matters of common interest, such as international market access*.' (NZTE Paper 2: Enabling services EDC (03) 53).

In 2006, following a review of Sector Projects as part of a wider review of a suite of services delivered by NZTE, the Cabinet Committee on Government Expenditure and Administration decided to continue with the then existing levels of funding for Sector Projects and that MED should play '*a more active leadership role in the interpretation and implementation of sector policy*'. In particular, MED '*should more clearly articulate the specific policy direction and objectives of the sector projects programmes; (and) act as a conduit across government agencies and NZTE to ensure that sector policies are well-aligned and impacting firms and sectors in a*

constant manner'. It was further noted that work on introducing clearer criteria for funding sector projects would take place. (EXG Min (06) 3/7).

In 2007 the Cabinet Policy Committee decided that government programmes should be built around identified areas of focus. The areas of focus that were identified were pastoral services; environmental solutions; advancing food and derivatives; health solutions; smart materials; and digital content and tools. (POL (07) 337)

In December 2007 NZTE outputs were restructured into five output classes to facilitate the provision of information on the impact of groups of programmes (and appropriations) towards a single outcome, *enabling officials to give robust advice to ministers on choices between outcomes or classes of outputs…' and to '…give greater clarity for robust evaluation, monitoring and reporting…*' (EDC (07) 260).

Sector development policy

Policy applying to sector development has evolved over a period of years in line with related thinking on the role of government in economic development generally. Governing frameworks are found in the NZTE Act, Crown Entities Act, and a succession of institutional and other incremental changes including analyses, government decisions, evaluations and ministerial communications to NZTE. These are discussed below.

Major influences and documents

In 2000 the establishment of the Ministry of Economic Development underscored a renewed interest in developing and implementing active industry policies. The Boston Consulting Group report "Building the Future" (2001) articulates the role for targeted and integrated economic development strategies (including strategically targeted Foreign Direct Investment attraction as one component).

A framework and process for economic, industry and regional development was subsequently agreed (CAB Min (01) 38/12) by Government to focus on support for four to six niche industry sectors with the highest growth potential, including that new policy initiatives have a clear and well founded justification in terms of contribution to higher growth.

The emerging economic and regional development sector policy focus was then refined through the Growth and Innovation Framework (GIF) which introduced foundation and key cross-cutting industry strategies and policies, and a more targeted sector focus (ie biotechnology, ICT, Creative). The newly merged (2002) New Zealand Trade and Enterprise organisation was responsible for implementing relevant sector strategies including those in the GIF.

Further work in 2003 (NZTE Paper 2 – Enabling Services, Sector Facilitation (EDC (03) 53)) resulted in agreement that the GIF sector strategies under preparation were selected because of their high potential for spillover benefits to other sectors. In the paper "Industrial Policy for the 21st Century", Rodrik (2004) provided a further guide for developing the direction of industry policies, in particular the need for coordination and collaborations of a strategic nature with industry (sectors) to improve productivity.

The Government then agreed (Framework for Sector Engagement (CBC Min (04) 70)) its engagement with sectors through delivery agencies such as NZTE should be based on those that do, or could make, a substantial contribution to sustainable economic growth based on either their contribution to GDP or potential to grow and add value across a range of other sectors.

Over the 2006-2009 period further evaluation, refinement and consolidation of policies and programmes included the following.

- Expenditure review of business assistance (EXG Min (06) 3/7). This noted the need to consider only fully subsidising those programmes which have the greatest spillovers arising from their public good nature and agreed that MED should play a more active leadership role in clearly articulating the specific policy direction and objectives of the sector projects programme;

- Output Class Review (EDC (07 260). This agreed to a new non-departmental output class in Vote Economic, industry and regional development for customised advice and support to regional institutions for the development of regional economic development strategies, and to sectoral industry bodies and groups of firms for the development and implementation of plans to improve the performance of sectors;

- Giving Effect to Areas of Focus to support economic transformation (POL Min (08) 15/14). This paper agreed to specific areas of focus selected because they offer opportunities to improve the performance and value for money from innovation, business assistance and tertiary education policy to the extent that these are intended to improve productivity and economic performance; and

- The Economic Growth Agenda – this cross-cutting plan of action (CAB Min (09) 45/8) aims to achieve New Zealand's economic growth potential and noted that NZTE and FRST would align their activities with the action plan.

Additional guidance provided to NZTE by relevant Ministers

The Enduring Letter of Expectation to statutory Crown entity Chairs from the Minister of Finance and Minister of State Services (December 2008) required that each Crown entity Board would keep under review the Crown entity's expenditure and identify particular expenditure or programmes that are not effective or providing good value for money, and act on those findings.

In February 2009 the Minister for Economic Development and Minister of Trade indicated in the draft NZTE Statement of Intent that a priority for NZTE should be to "support businesses that are most likely to generate significant economic returns for New Zealand".

Previous evaluations

A 2005 review of economic, industry and regional development policies and programmes highlighted the key strategic choices to be made about the direction of policy and the balances in NZTE support activities. It was noted that these would

require trade-offs between promoting spillovers and possible horizontal impacts as against internal firm and sector performance.

The July 2006 review of NZTE Sector Facilitation activities noted the continuing evolution of NZTE's implementation of sector facilitation policies and saw the need for better direction and clarification of policy outcomes and priorities, where this may diverge from original policy objectives.

The October 2006 Expenditure Review of Business Assistance identified a number of key principles to guide support programmes including that business assistance programmes should:

- only tackle the market failures which are economically most important and which can be alleviated most cost effectively
- be coordinated with and complement other Government programmes nationally and locally aimed at addressing firm and industry level market failures
- have a programme design that aims to ensure that the programme results in additional economic activity to that which would normally be expected to occur.

Summary

Although sector policies have evolved over time, certain common themes have not changed. Support programmes are expected to focus on a limited range of sectors that have the highest economic growth potential, have the capacity to deliver spillover benefits to other sectors, and result in economic activity additional to that which could be expected to occur normally.

2.2 Intervention rationales

Any government intervention in the economy should be based on a clear rationale setting out the net economic benefits it is expected to produce. Without a proper intervention rationale it is difficult to attribute any occurring changes (benefits) to a particular intervention. A clear rationale also helps policymakers target the intervention at specific problems, thus increasing the likelihood of the intervention being proportionate to the problem it seeks to address and minimising its risks and costs.

Ex-ante cost benefit analysis of interventions should take into account all potential risks and costs and highlight any remaining uncertainties that cannot be quantified. Some of their most common risks or unintended consequences include incentives placed on private sector agents to put resources into activities that are not in the national economic interest, unintended use of public resources, shielding firms from competition, crowding-out of the private sector and rent-seeking[8].

[8] See Chapter 3 "Public Support for Science and Innovation", Australian Productivity Commission, 2007. Available at: http://www.pc.gov.au/data/assets/pdf file/0017/37124/science1.pdf.

A major risk of inadequately defined interventions is that their funding could be treated as an entitlement to be spent on a wide range of activities, some of which may only be tenuously linked to its core aim. If the intervention ends up being used for things that are out of line with its original intended purpose, it is unlikely to be able to address the underlying problem and produce its expected (net) benefits.

Even if the intervention is implemented as intended, there is always a risk that over time it could become captured by interest groups. This could create a dependency culture where recipients become overly attached to a subsidy. A rational reaction on the part of such recipients might be to expend resources to engage in rent-seeking, ie finding ways to prolong the government support or seeking out other forms of government assistance, instead of using them to improve the efficiency and competitiveness of their business.

Apart from these direct risks and costs, government has to ensure that public money is used in an appropriate way. The two key concepts that help government ensure this is the case, are opportunity cost and additionality. A proper intervention rationale has these concepts at its core.

Government intervention always consumes valuable resources. If the intervention costs money it is a financial cost to the taxpayer. In addition, there are the direct resources in terms of government officials' time and effort spent on the intervention. This money and these resources could be put to other uses or given back to the taxpayer. The cost of not doing that is the opportunity cost. Understanding what the opportunity costs of an intervention are is necessary to assess whether it is likely to generate good value for money for the taxpayer.

Expectations about the true impact of an intervention must consider what would have happened in the absence of the intervention. If something would have happened anyway, it would be wrong to attribute it to the intervention. The impact should be measured in terms of the additionality an intervention has produced. A clear intervention rationale is essential for understanding reasonable expectations for additionality. It also mitigates against the risk of intervening in an area to produce 'benefits' that would have happened anyway.

It is generally accepted that a competitive free market is the best way of allocating resources in a significant part of the economy. But it is not perfect and may not always lead to an efficient allocation of resources or produce desired welfare outcomes. One such market failure is where the consumption of a particular good by one person does not prevent another person from also consuming it. These are called public goods. As private firms are not able to charge for their consumption, they are unlikely to produce such goods and services, or to produce them in sufficient quantities.

Justifications for interventions under Output Class 2

The most common market failure rationales on which sector support delivered by Output Class 2 should be based are certain types of knowledge spillovers and coordination failures.

Knowledge spillovers

The knowledge spillover argument is strongest for some forms of government support for R&D. Therefore, it is directly relevant to the types of support provided under the government's research, science and technology policies. However, the argument provides a prima facie rationale for government support under Output Class 2 for activities subsidiary to direct R&D, such as diffusing or developing new technologies with horizontal aspects, and demonstrating to the market what benefits they can produce.

Coordination problems

Coordination failures refer to the specific circumstances where new technologies require coordination of investment and production between entrepreneurs. For this rationale to provide a robust justification for intervention it needs to be proved that there is a market failure specific to the activities of certain firms and that by providing assistance to those firms there will accrue a significant spillover benefit that outweighs the cost of the intervention.

Some argue that coordination problems are a general condition for small enterprises seeking to compete in larger markets. For instance, it has been argued that because of New Zealand's small average firm size, small domestic market, and geographical isolation, assistance is desirable to help firms realise otherwise unrealisable business opportunities. However, interventions based on a general rationale like this risk providing assistance in cases where there are no legitimate market imperfections, which is likely to reduce net economic welfare.

Take the example of a small winemaker, which may make more sales and expand its production if the government facilitates contacts in overseas markets. But, it should be possible for the winemaker to obtain these contacts itself with the help of the wine industry association or through attending overseas trade forums. It may be expensive to do so, but that is an inherent part of the cost structure of all New Zealand businesses, large and small. Alternatively, myopia or lack of skills may prevent the winemaker's management from making the contacts necessary to successfully take advantage of overseas markets. These are not compelling cases for government support. If the government does provide assistance, what would be the net benefit to New Zealand? If all that is achieved is higher sales and production by the particular winemaker there is unlikely to be a net benefit, and probably a net welfare loss after taking into account the reallocation of resources and the costs of the programme. There would only be a net benefit if a significant spillover is derived from the intervention (eg, it substantially raises awareness of all small high quality New Zealand wine producers among certain discerning overseas wine buyers), which outweighs the costs of the intervention.

The most robust case for government intervention in the cases of collaboration failures appears to be for new technology in new or emerging industries where there is a high degree of uncertainty about potential markets and the upstream and downstream collaborators that are needed to make the technology a success. As Rodrik[9] states, "...all industries can in principle operate at some level in the absence

[9] Rodrik, Dani "Industrial Policy for the Twenty-First Century", Harvard University, September 2004.

of clusters. This suggests that what needs support is not specific sectors per se, but the type of technologies that have scale or agglomeration economies and would fail to catch on in the absence of support. Simply providing trade protection [industry support] to a particular sector may not overcome the coordination failure that prevents the adoption of a modern technology, since it increases the profitability of operating without that technology as well. The appropriate policy intervention is focused not on industries or sectors, but on the activity or technology that produces the characteristics of a coordination failure." "It is activities that are new to the economy that need support, not those that are already established."

Conditions for effective industry support policies

The establishment of robust rationales for industry support policies to address market imperfections is a necessary but not sufficient condition for undertaking the interventions. The design and implementation of industry support policies will be critical to their effectiveness in meeting their objectives. Poorly designed and implemented policies could have costs that outweigh potential benefits. These costs include:

- Poorly targeted interventions or scope creep that result in support for activities that have little or no spillovers associated with them.
- Maintaining interventions that are no longer needed or have become irrelevant because of changes within firms or industries.
- Rent seeking, whereby particular firms receive support because of their lobbying efforts rather than for the spillovers that potentially exist for their activities.
- Ministers using interventions to shore up political support rather than for sound economic reasons.

Policies that do not directly address particular market imperfections are likely to result in net economic welfare costs. This is because they interfere with the normal functioning of market allocation mechanisms and have costs associated with them. This interference and the costs are larger the more that processes become subverted away from efficiently addressing market imperfections.

Summary

A clear intervention rationale based on sound evidence, together with an analysis of how government intervention can improve on the status quo, are essential for establishing the likely impacts of an intervention and its additionality. Using a rigorous market failure based framework also allows opportunity costs to be assessed. Proper use of these concepts is particularly important if the impacts of an intervention are difficult to quantify (and monetise) and no net benefits can be calculated.

2.3 Literature review

Introduction

A review of the relevant international literature on sector support was undertaken as part of building the evidence base for this evaluation. The review also examined what sector support schemes and programmes exist in other countries. Three key topics were of particular interest for the purposes of this evaluation and guided the scope of the literature review. These were: rationales for government intervention; international comparisons; and the measurement of spillovers and benefits. Finally, the review addressed implications of the findings for New Zealand.

More specifically, the literature review was guided by the following questions.

Rationales/Market Failures

- What are the underlying rationales/market failures for government intervention in this area and does sector support work?

Identification and measurement of spillovers and benefits

- Have spillovers of sector support been previously evaluated?

International comparisons

- Are there common characteristics of successes or failures of support schemes?

Implications for New Zealand

- Are these lessons transferable to New Zealand?

Defining sector support

Sector support is also variously referred to in the literature as industrial policy, targeting innovation and industry collaboration. Literature in this area is fragmented and inconsistent providing no agreed upon definition of industrial policy.

Pack and Saggi (2006) define industrial policy as a type of selective government intervention or policy that is targeted at sectors that offer high growth potential and which in the absence of such intervention would not realise their full growth potential. A useful framework for thinking about the sector composition of the New Zealand economy is provided by the Australian and New Zealand Standard Industrial Classification[10].

Industrial policy rationales

Market failures are extensively covered in the literature as providing a rationale for industrial policy. However, the most widely accepted economic rationales are almost solely based on externalities in R&D. In contrast to tax incentives and subsidies for R&D, OC2 provides a variety of business assistance services to promote firm and industry growth. The international evidence reflects differing emphases towards

[10] http://www.stats.govt.nz/browse for stats/industry sectors/anzsic06-industry-classificatiion.aspx.

R&D. For example, Australian sector policies emphasise R&D, in contrast to Ireland which has policy instruments closer to those of OC2.

The most commonly accepted economic rationale for innovation policy intervention is that of R&D externalities (that is, benefits to society and firms that are significantly more than to the individual firm, hence a tendency for firms to under-invest in R&D).

Alternative rationales are cited in the literature providing theoretical justification for sector support, including: coordination failures and information externalities (Pack and Saggi, 2006); agglomeration externalities and imperfect competition (Guall and Jodar, 2006); and credit market imperfections and information asymmetries (Rodrik, 2008).

Despite the theoretical rationales described in the literature, sector policies in many countries lack formal rationales. The basis for industrial policy is the "identification of sectoral opportunities and challenges, focusing on practical application to individual sectors"[11].

In the absence of rationales how are these opportunities identified? Government agencies identify comparative advantage or where they would like to have comparative advantage or seek to promote competition (Rodrik, 2004). This introduces a political aspect to intervention rationales, where aspirations towards comparative advantage in certain sectors determine the structure of industrial policy.

In some cases this strategy has been successful, for example, South Korea's automotive industry in the 1960s -70s (Amsden, 1989) where a conscious decision was made to create an auto industry, or alternatively the promotion of established winners such as Nokia in Finland (Yla-Anttila and Palmberg, 2007). At other times this approach has failed, even within the same economy, for instance in the case of South Korea's manufacturing of oil tankers by Hyundai in the early 1970s which required government bailout.

'New' industrial policy

Industrial policy rationales have evolved over time, reflected in the movement away from picking winners to a more horizontal approach. Specific sectors were originally selected as major drivers of growth, such as manufacturing in Japan and Korea in the 1960s and in Europe in the 1980s. New industrial policy or systemic industrial policy places emphasis on innovation and knowledge diffusion by facilitating clusters (Soete, 2007). The theoretical rationales for systemic industrial policy focus on the promotion of comparative and competitive advantage and changing patterns of specialisation rather than market failures (Aiginer, 2007). Comparative advantage is not static. Accordingly, industrial policy will evolve as perceived comparative advantage changes (Aiginer, 2007). However this potentially limits the ability to target directly or evaluate intervention actions.

[11] DG Enterprise "Mid-term review of industrial policy: A contribution to the EU's Job and Growth Strategy" COM (2007) 374.

The transition towards 'new' industrial policy has changed how sectors and industries are 'selected' (Navarro, 2003). Maincent and Navarro (2006) suggest there is a greater emphasis on a wider spectrum of targeted industries rather than promoting industrial champions or picking winners (given that these latter strategies that have generally failed)[12].

Innovation in high-tech and non-tech industries means industrial policy covers a wide range of sectors in manufacturing, health care, the non traditional primary sector, ICT, and food and beverage, all of which have been identified as high growth potential industries (Rodrik, 2008).

Manufacturing has traditionally been a key sector in industrial policy, seen as a driver of growth in several countries, including Ireland, Japan, Finland and Germany (Aiginer, 2007, Pack and Saggi, 2006). Manufacturing sector policy has evolved with a greater focus on performance drivers that do not require 'picking winners,' including business services, infrastructure and management systems such as Lean Manufacturing (Lewis, 2000). However, these types of programmes tend to be focused on commercial best practice, rather than delivering the types of sector benefits that lie at the theoretical basis of sector policy.

The health sector has received special attention in industrial policy. The health sector comprises two key areas: the health sector (providing health services) which aligns with social interests; and related innovation in the industrial sector (eg pharmaceuticals and biotechnology) which can contribute more directly to economic growth.

Augusto and Gadelha (2006) highlight the distinction between these two areas and the need to link health and economic growth, building capabilities and integration across both. They outline the framework to do this for the Brazilian health sector. However, as it is a newly implemented programme evidence of the impact is not yet available.

The new industrial policy incorporates innovation and the development of industry clusters to capture knowledge and agglomeration externalities respectively.

Innovation is seen as being cumulative in nature, requiring technology cooperation and collaboration among firms (Navarro, 2003). An important implication for New Zealand, worth highlighting, is the Scandinavian approach of drawing very strongly on science and technology drivers, as outlined below.

Impacts of industrial policy

To accurately assess the impact of sector policies, empirical evidence is required to determine under what characteristics sector support is likely to be successful in stimulating economic development. While there is popular perception that certain industries (eg high-tech industries') are more innovative and can generate spillover

[12] *The Economist* editorial of August 7-13, 2010 argues "However many view justifications are invented for the government to pick winners and coddle losers, it will remain a bad old idea."

benefits to the wider economy, the empirical evidence of this is weak (Aiginer, 2007). The most widely applied measure is knowledge spillovers from R&D.

As noted above, there are a number of difficulties in relation to identifying rationales for industrial policy. The identification of spillover benefits from sector intervention is similarly challenging. Pack and Saggi (2006), in their survey of the empirical literature in this area, concluded that there is little empirical evidence to support government intervention even when market failures exist. This highlights the need for clear programme rationales focusing on additionality and spillovers.

Rodrik (2008) states that proponents and opponents of business support programs use different evidence and data to make their point. Proponents tend to rely on case study evidence to demonstrate that intervention has beneficial effect for firms. In contrast, opponents rely on econometric studies to show that industrial policy instruments do not provide the benefits they intend, largely due to identification issues and endogeneity bias that give uninformative results.

Cluster policies are empirically analysed on the basis of Marshallian externalities, characterised as the greater cumulative output of an industry the more productive the technology of each individual firm (Pack and Saggi, 2006). While benefits accrue to firms from sector support, spillovers are hard to determine (Pack and Saggi, 2006). The justification for intervention is limited as the size and nature of externalities is highly uncertain.

Morris et al (2004) used a case study of a South African auto manufacturing cluster to analyse the effectiveness of government intervention through the evaluation of spillovers. Their findings indicated that although spillovers were present they were limited to the immediate component suppliers associated with each cluster, with limited growth or knowledge diffusion extending along the supply chain. The authors found that cluster effects did not extend beyond the collaboration project. In general, the empirical literature does not necessarily suggest that there are no spillovers, but rather that due to identification and measurement issues that they are difficult to quantify.

International comparisons

Sector support services are implemented widely by governments abroad. However, most are related to R&D and therefore have limited comparability with OC2.

A comparison of the characteristics of different international policies can help us understand the role of government intervention. There is significant variation in the scope and nature of policies. In general the sectors targeted by different countries do not differ greatly. Manufacturing is traditionally a key sector for intervention, identified as a driver of growth. Other commonly targeted sectors are electronics and ICT, the health sector, and the food and beverage sector.

The Enterprise Directorate-General of the EC has extensive industrial and innovation policies to promote specific sectors. There are many contributing programmes structured to promote innovation, internationalisation and industry clustering. Programs include Entrepreneurship and Innovation Policies, Industrial Policy, LEAD

market initiative which specifies six key markets,[13] to promote innovation. DG Enterprise conducts regular evaluations at the mid-point and conclusion of all their policies and initiatives. The mid-term LEAD evaluation found impacts of this initiative were inconclusive.[14] In addition it determined that more work was needed to identify market failures (the initiative having been running for 2 years) and more work was needed to identify the value added benefits.

The actions and interventions of the European member states are tightly linked with DG Enterprise. This is particularly evident in a smaller economy such as Ireland. Enterprise Ireland is a government entity that applies industrial and innovation policies. The instruments used in sector support are similar to those used in OC2: professional services, business opportunity events, business partner programs (mentors), and innovation vouchers of €5000. In 2009, Enterprise Ireland spent €30m on supporting innovation through R&D. It also received €37m from the EU to continue facilitation of network clusters.

The Scandinavian countries, Finland in particular, have a very close integration of science, technology and innovation, facilitated through a strong link created between industry, university and research institutes' collaboration (Yla-Anttila and Palmberg, 2007). Tekes is a publically funded organisation, providing financing for R&D and innovation and acts as a facilitator for creating industry links. Norwegian instruments of industrial policy involve promotional activities supporting new ideas and products, assisting firms and businesses to adapt to evolution in productive and service sectors with three organisations: SIVA, Innovation Norway and the Research Council of Norway[15].

Singapore's industrial policy is managed through SPRING Enabling Enterprises, a publically funded organisation. Industrial policy is conducted through three integrated arms of the industry: Capability Development Program (CDP), Consumer Centric Initiatives (CCI) and Local Enterprise and Association Development LEAD. SPRING utilises similar instruments to those used in Ireland. In addition to R&D support, it provides innovation vouchers and facilitating clustering. Government support can provide 50-70 percent of costs incurred in advancing a firm or industry. It covers all costs incurred by the firm such as salaries, living costs, subcontracting and IP. While the targeted sectors appear to be similar to those of other OECD countries including New Zealand, the level of intervention in Singapore is significantly higher than other countries. There has been no evaluation of this approach to determine whether there are greater net national benefits as a result.

Finally, the United States has no explicit federal government policy on sectors. Although there is considerable assistance in the US, in contrast to the EU it is implicit and often piecemeal, targeting defence contracts or industries considered to be of particular strategic or political importance. It can be difficult to establish clear economic rationales for such initiatives even with respect to comparative advantage. An important characteristic of industrial policy in the US is a high degree of regional

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[13] Six key LEAD markets, eHealth, Bio-Based Production, Sustainable Construction, Textiles, Recycling and Renewable Energies.
[14] http://ec.europa.eu/enterprise/dg/files/evaluation/midterm_review_lead_market_initiative_09_2009_en.pdf.
[15] http://www.regjeringen.no/en/dep/nhd/selected-topics/industruments-of-industrial-policy/Instruments-of-Industrial-Policy.html?id=426449.

specialisation within clusters (Ketels, 2007). Ketels concludes that despite the US having a less active stance in this area and lower expenditure, there is no difference on the impact to specific industries or the general business environment.

In conclusion, it appears that the level of public and private sector contributions vary considerably between countries as does the level of intervention. Across all of these different international policies, some similarities can be identified, such as the sectors targeted. However, the limited number of evaluations of these policies restricts our ability to accurately assess their underlying rationales and impact. Information on these schemes has been sourced directly from the relevant ministry or agency websites, which outline only who is targeted and the assistance provided with no rationales.

Implications for New Zealand

In summary, literature on modern sector support policies, or industrial policy, usually refers to market failures as the underlying justifications for government interventions. Rodrik (2004 and 2008), Procter (2008) and the Australian Productivity Commission (2007) are recent main proponents of rationales for government intervention in sector support policies. Recent work undertaken for this evaluation, by Infometrics, supports this approach to developing, analysing and evaluating sector policy[16].

Our review of the literature has highlighted several key findings that have implications for NZTE's Output Class 2:

- Most countries use sector development policies, either explicitly or implicitly. Many are large, they are generally R&D focussed, and they may not necessarily conform to theoretical definitions of sector policy.
- There is theoretical acknowledgement of the need for rationales based on market failures but in practice there are few formal ex-ante rationales.
- Political aspiration is a common basis for determining intervention practice.
- The most widely adopted rationales are based on externalities in R&D, providing limited insight for Output Class 2 sector support.
- Internationally, the evaluation evidence of performance is modest and what little there is, is not very positive.

[16] This report is available separately.

3. Findings: Regional Activities

This chapter presents and discusses findings on regional activities delivered through Output Class 2.1: development of institutions and capability at a regional level.

3.1 Scope and methodology

Apart from being a rather small component within Output Class 2, OC2.1 activities are being phased out. Some activities have already terminated, while others such as the Regional Strategy Fund (RSF) will cease at the end of the current financial year (2009/10). In light of the phasing out of OC2.1, the limited resources it consumes and given the availability of a fairly recent evaluation of regional activities; this sub-output class is not a major focus of this evaluation. We restrict ourselves to providing a brief update on developments since the last review in 2008.

It should also be noted that the administration of the Enterprise Partnership Fund (EPF) by MED means that the Major Regional Initiatives (MRI) successor scheme is outside the scope of the present evaluation.

The methodology employed for evaluating OC2.1 consists of a review of readily available information from NZTE, MED and other sources.

3.2 Background and programme description

In 2000 government decided to take more active steps to support regional economic development. There was a sense that some regions were being left behind economically and as a result also socially and environmentally[17]. The Regional Partnership Programme (RPP) was intended to:

- better coordinate activity impacting on regional development, both at central level and between central and local government
- lead to greater collaboration and integration between regions
- improve strategic thinking and a better utilisation of resources within regions.

In order to achieve the above objectives, 26 regions were given funding to develop regional economic development strategies. Major Regional Initiatives supported significant regional projects that were deemed capable of enhancing regional strengths. Other grant programmes that were funded as part of RPP were in the area of capability building and for developing regional strategies. Until 2007 a total of 146 grants worth $56.1 m were awarded, 83 percent of which was spent on MRIs.

[17] 'Regional Partnership Programme Evaluation', MED.

In 2007 government decided to significantly change regional policy by abolishing the RPP, including the MRIs. The latter were replaced by the Enterprise Partnership Fund, which has been administered by MED. MED conducted a thorough evaluation of the RPP and MRI programmes in 2008 (see below).

Broadly speaking Output Class 2.1 is the remainder of the programmes which were disestablished in 2007. It has included inter alia the Regional Strategy Fund, the Enterprise Culture and Activities fund and funding to encourage regions to develop regional strategies.

3.3 Previous evaluations

A thorough evaluation of the RPP, including the MRIs, was done by MED in 2008. The evaluation concluded that there was clear evidence of the RPP having improved the regions' strategic focus and thinking about their strengths and (local) drivers of growth. There was evidence that some regions with limited opportunities were making good and effective use of their resources and strengths, not least due to good management. More specifically the evaluation found that:

- *"the economic development strategies improved under the RPP through becoming more integrated with other regional and national strategies, and functional…"*
- *"and that capability and MRI projects were linked into economic development strategies and* regional strengths".

(MED Evaluation, Regional Partnership Programme, p. 6).

However, the evaluation also concluded that proposals requiring funding should be subject to cost benefit analysis, as opposed to economic impact assessments (EIAs) that proved to be only of questionable usefulness, and that the success of MRIs projects could not be determined due to inadequate information about their impacts.

3.4 Funding

Since the previous evaluation and the restructuring of the NZTE output classes in 2008, Output Class 2.1 has consisted of a small number of activities, the main ones of which were projects funded under the Regional Strategy Fund and the Enterprise Culture Skills and Activities Fund.

Of the more than $40 m that is spent on OC2 every year, only $2.4 or approximately five percent goes to OC2.1.

3.5 Analysis

Table 4 presents information on whether performance expectations were achieved for activities under Output Class 2.1. OC2.1 met most of its key performance expectations that were agreed between MED and NZTE in the output class agreement between 2007/08 and 2008/09. It should be noted that the period 2007/08 refers to the period before the changes to regional policy were introduced and the restructuring of the output classes.

Table 4: Performance expectations for activities under Output Class 2.1

Activity	Year	Performance expectation	Achieved/not achieved
Development of regional strategies	2006/07	10 regions to renew their strategies, 100% of applications to the RPP panel are clearly presented and contain robust analysis.	6 regions renewed their strategies, whilst a few delayed renewal until implementation of Regional Strategy Fund in July 2007.
Implementation of regional strategies	2006/07	¾ of regions to develop capability building projects to implement regional strategies. These projects and activities funded through capability funding or MRIs are consistent with regional economic development strategies.	62 percent of regions developed capability building projects. There was a drop in application in Q4. The upcoming introduction of the Regional Strategy Fund may have affected this.
Promotion of greater collaboration and broad partnerships	2006/07	3 inter-regional applications, 8 MRIs developed.	5 inter-regional applications. 7 MRIs, with a further proposal being made to the EPF after the termination of the MRIs and the introduction of the EPF.
Promotion of best practice	2006/07	1 cluster conference; 6 regional workshops; 4 case studies.	All completed.

As shown in Table 4 above, most performance expectations have been achieved. The development and implementation of a regional strategy should have a positive influence on the economic development of those regions that have implemented them, but any impacts will be difficult to measure. It will be difficult to detect a significant impact so soon after for example the implementation of a regional strategy. The activities to promote collaboration and partnerships such as the MRIs and EPF should equally have a positive influence.

However, whether any specific initiatives are likely to have a positive economic net impact depends on the detail of the ex-ante assessment work that has been carried out, such as CBA, and their follow up/implementation. The findings of the 2008 review are still significant and it is important that adequate information is collected to be able to assess the impact of projects.

4. Findings: Strategic Initiatives

This chapter presents and discusses findings on strategic initiatives delivered through Output Class 2.2: development and leadership of growth strategies at a sector level.

4.1 Background and programme description

Since 2007 NZTE has used strategic initiatives (SIs) to deliver long-term interventions through project work in support of economic growth (NZTE Board Paper, 12/08/2009). Until August 2009 the list of SIs was as follows:

- Integrated Health
- Creating Value from the Primary Sector
- Designer Lifestyle
- Global Manufacturing
- Globalisation of NZ Technology
- Entertainment
- Sustainability.

In August 2009, following an internal restructuring of NZTE and a review of the strategic initiatives, it was decided to reduce the number of SIs to the following three:

- Health
- Creating Value from the Primary Sector
- Emerging Technologies.

In management terms, the SIs were separated from Sector Projects and given their own Director of SIs. A stated aim of the restructured SIs is to make them more long-term, in the sense that any impacts are expected to occur over a period of at least five years.

Some activities of the previous SIs have been wrapped into the three new SIs or continue to be carried out as a sector project (eg Lean Manufacturing). The year 2009/10 is viewed as a transition year for the SIs.

The SIs are part of NZTE's delivery and implementation of sector policy.

4.2 Funding

Table 5 shows the total budget for the SIs in 2009/10 and in the coming years (note that these figures are the direct costs and thus exclude NZTE staff costs and overheads):

Table 5: Funding of Strategic Initiatives 2009/10 – 2011/12

SI	2009/10	2010/11	2011/12	Total
Health	$1,895,000	$1,865,000	$1,500,000	$5,260,000
Primary Sector	$1,796,000	$1,796,000*	$1,796,000*	$5,388,000*
Emerging Technologies	$2,140,000	$2,000,000	$1,800,000	$5,940,000

*These figures are currently under review and may change (Source: NZTE Board Paper, 12/08/2009)

4.3 Rationale and objectives

Intervention rationale

NZTE do not solely use a market failure framework as an underlying rationale for the SIs, nor do they view it as appropriate. Spillover benefits are seen as desirable and form part of the intervention logic and primary objectives.

NZTE have used the Horizons framework developed by McKinsey to seek offshore opportunities for New Zealand firms that can be realised in collaboration with NZTE (see Table 6 below). The Horizons framework consists of three horizons[18]: a short term horizon of one to five years, a medium term one lasting three to ten years and a longer term horizon of between five and twenty years. Although not a primary objective, spillover benefits are seen as less likely if the timeframe is H1 or H2, but more likely if the focus is on H2/H3.

Table 6: Horizons framework

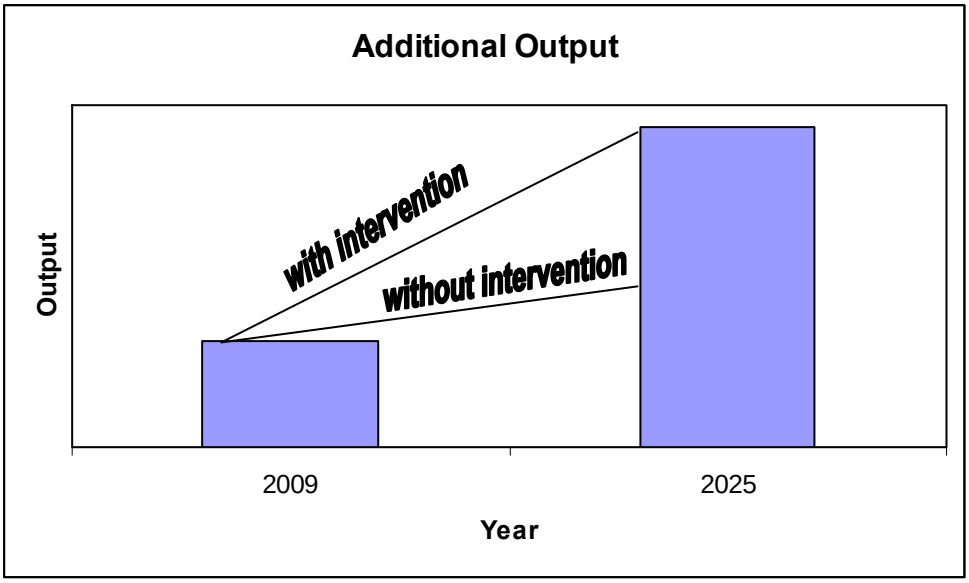
Time to Impact	Horizon 1: short term (1-5 years)	Horizon 2: medium term (3-10 years)	Horizon 3: long term (5-20 years)
Aim	Extending and defending the core	Capturing emerging technologies	Creating viable options
Typical focus of activity	• Capturing current opportunities • Operational efficiency and productivity enhancements • Product and market extension • Leveraging existing networks	• Emerging markets and channels • New business models, new products • Building industry capability/infrastructure • Raising internationals profile • Building new networks	• Creation of new industries • Transformation of existing industries • Systemic changes to underlying conditions for growth • Global branding

The SIs focus on horizons two and three. By seeking out opportunities, especially offshore, the SIs target 'new, additional growth' through a cross–sectoral approach. Identifying and harnessing the potential for this 'new economic growth (ie additional

[18] There is also a Horizon 0 which refers to cost reduction.

returns)' is at the core of this approach[19]. By making 'changes to key systemic conditions for growth' NZTE attempt to affect long run economic output (for example by 2025). The following diagram, based on a similar diagram provided by NZTE during discussions, is a visualisation of how NZTE action impacts on growth.

Figure 4: The impact of NZTE action on growth



Sectors for engagement are then chosen on the basis of 'where improvements in their productivity are likely to result in improvements in the overall performance of the New Zealand economy'[20].

NZTE applied the following industry/sector selection criteria to determine projects and sectors to target[21].

[19] Ibid.
[20] NZTE handout distributed at meeting 22 December 2009.
[21] Taken from NZTE handout distributed at meeting 22 December 2009.

Top line criteria

- Clear, growing international opportunity
- Current or future potential competitive advantage for New Zealand, eg growth potential higher than global average (ie NZ can increase market share over time), core competencies to build on
- High impact levers still available to pull, ie significant potential on (government) investment

Secondary criteria

- High value add per FTE
- High export intensity
- Potential for spillovers
- Potential to anchor value generation in New Zealand

As part of the decision whether to 'invest' in a sector or industry, NZTE undertake a gap analysis which consists of identifying 'key conditions for accelerated growth' and plotting the current position and the desired position to analyse what needs to be done, eg the investments that need to occur, to close this gap[22].

Once the gap analysis has been carried out, an action plan is developed. The action plan consists of the following steps[23].

- Identifying who has to "invest" and how much, recognising that the investment may not have to be in the form of money but could be a change in behaviour or regulation.
- Identifying any dependencies, eg changes in one condition that needs to occur prior to another condition being addressed.
- Identifying the likelihood of investment and risks, eg is change in key condition likely to occur? If not, assess whether overall investment is worthwhile.
- Progress is measured by developing baseline measurements for each growth condition and ultimate and interim targets.

[22] From handout distributed by NZTE at meeting on 22 December 2009.
[23] Ibid.

Apart from the potential for higher economic growth, NZTE assess whether firms in an industry or sector face common challenges or opportunities, the value NZTE can add, and the difference between 'business as usual' and the likely outcome due to the support. The sector is then engaged either collectively or by working with individual firms. In the latter case, NZTE's aim is to benefit the sector more widely through engaging with individual firms.

Objectives

The SIs are aimed at changing the fundamental systemic conditions of an industry to stimulate both sector and overall economic growth. The interim outcomes targeted by the Sis are:

- higher profile for NZ firms
- more business deals (especially with international partners)
- introducing NZ firms to international clients and markets
- enhanced use of and new IP
- business development
- an improved environment for growth.

The final outcomes for the sectors/industries the SIs targets are higher:

- revenues
- profits
- levels of capital/ODI and FDI
- employment
- value add
- productivity.

Progress towards achieving these outcomes is measured by establishing milestones, feedback from clients on the quality of the support, and the number of firms that the intervention has reached.

4.4 Analysis

The absence of a focus on explicitly alleviating market failures or targeting spillover benefits may make the identification of additionality (ie where public intervention has led to results that would not have happened otherwise) more difficult. Likewise, it is not conducive to taking account of opportunity costs and calculating the net economic benefit to New Zealand. In other words, a rigorous demonstration of value for money for the taxpayer becomes less straightforward. This is partly why best practice from around the world increasingly emphasises the need to develop rigorous

intervention rationales, usually based on market and coordination failures or social equity considerations[24].

Documents on the areas of focus, which provide the main policy framework for sector policy initiatives, ie Output Class 2, make several direct references to the need for considering spillover benefits.

The nature of NZTE's role is to be business (or commercially) focused, whereas public policy making should have as its main concern the role of the state or, in other words, that investing taxpayers' money on their behalf leads to significant benefits that would not happen otherwise. Both strive to produce value for money for the taxpayer. From a normative public policy or good governance perspective additionality is of key importance. A commercial view might focus more on individual cases and whether public involvement would help clearly and objectively add value in a particular instance. The analysis on the following pages examines the additionality, through wider benefits and things that would not have happened otherwise, that the SIs have generated or are likely to generate.

[24] Examples include the better regulation agenda of the European Union and the regulatory reform programme of EU countries. Of particular note are the impact assessment guidelines and their advice on developing a problem definition.

5. Findings: The Emerging Technologies Strategic Initiative

This chapter presents and discusses findings on the Emerging Technologies Strategic Initiative.

5.1 Introduction

The Emerging Technologies Strategic Initiative (ET SI) "works with industries committed to investing and adopting new and emerging technologies". It offers assistance to build "business capabilities, credibility, investment and networks required for them (businesses) to move into business development and international market building" (NZTE Board Paper, August 2009). The goal of the Emerging Technologies SI is to identify technology opportunities and to facilitate the development of new industries around them.

The technologies that NZTE supports are thought to have the potential to lead to the emergence of large new exporting industries based in New Zealand. The technologies are expected to lead to the development of a new product that is manufactured in New Zealand or to a new product or technology the use of which in existing export industries makes these more competitive on the international market.

Prior to the introduction of the ET SI, a number of the technologies supported by the ET SI had already received support via technology project areas and the Trilateral forum, which aligns the activities of FRST, NZTE and Tertiary Education Commission.

5.2 Current Emerging Technology Engagements

There are currently three ETs[25]. High Temperature Superconductors (HTS), Titanium Alloy Powder Applications and Industrialising Environmental and Clean technologies. The first two are the most advanced ETs. In previous years other technologies, such as Jain Slee Industry Forum and Sensor System Integration, were also part of the ETs. Since 2008/09 the Jain Sleet Industry Forum has been part of the sector projects work plan (enterprise & innovation). Due to its close fit with the ongoing work in the Primary Sector SI on developing innovative technologies to support the primary sector, the Sensor Systems Integration network projects has been moved into that SI.

The Board approved $2.14 m in funding (2009/10) for the ET SI[26], excluding NZTE staff and overhead costs, though the forecast spend for 2009/10 is approximately $990 K for the Titanium project and $350 K on HTS. The remainder will be spent on clean technologies and managing the Trilateral Programme, whose aim it is to identify 'potentially very large international industries for New Zealand'.

[25] NZTE Board Paper, 'Approval for Emerging Technologies Strategic Initiative', 12 August 2009.
[26] Ibid.

This evaluation focuses on the HTS and Titanium Alloy powders support. A substantial part of the information on which the analysis on titanium alloy powders is based rests on a case study prepared by NZTE.

5.3 Titanium Alloy Powder Applications Technology

Background

Titanium is a highly priced metal that is used in certain aerospace, health and military products. Its high price is partly due to limited supplies and its highly complex, energy intensive and environmentally dangerous production process. According to studies commissioned by NZTE, global sales of titanium in 2007/08 were NZ$32 billion.

Titanox Development Ltd, a spin-out from the University of Waikato, has developed a process for making high value pure titanium alloy powders. According to information supplied by NZTE this process is faster, cleaner and less energy intensive than other existing processes. It makes titanium more affordable and therefore accessible as an alternative for use in industrial products that currently do not use it in their manufacture. In November 2009, Titanox began producing titanium powders with the capability of producing 15 percent of the world's supply.

Intervention logic and objectives

This section outlines the intervention rationale or market failure the project tries to address; the objectives, including the benefit for the New Zealand economy; and the impact or likely outcome of the intervention.

Although developing the new process and supplying such a significant proportion of the world supply of titanium powder is a success in itself, NZTE recognise that the real value added from the titanium alloy powder may come from the production of the appliances in which it is used. The aim of the titanium powder ET SI is therefore to help develop an applications industry based upon Titanox powders. In terms of the Horizons framework, NZTE view it as an H3 activity.

It appears that while New Zealand has firms that could potentially manufacture titanium products, they currently do not do so, or at least not to a significant degree. The problem appears to be in part an information failure, in the sense that the potential New Zealand based applications industry does not yet fully understand the uses to which the new alloy powders can be put, the markets for titanium products and why producing these products is in the best interest of their business. Given the relatively small size of the fledgling industry[27] and of the firms themselves, the basic information problem, it is argued, may be compounded by a collaboration problem. In essence, small and young firms are inexperienced at developing ways to overcome their scale problems by, for example, collaborating with each other.

[27] At the time of undertaking this evaluation, there were four firms involved. We understand that since this date, there are now more firms undertaking product development investigations and a total of 33 firms are involved with TIDA.

While it is likely that over time both problems would be overcome or at least diminish in importance, it is argued that this might take unacceptably long and risk the patent and the application of the Titanox process moving abroad.

The intervention is aimed at ensuring that any spillover benefits from Titanox's alloy powders on the titanium applications industry are harvested in New Zealand. The challenge is to develop in New Zealand an applications industry based upon the new Titanox powders.

The following objectives were described in a case study supplied by NZTE.

- Develop critical product development, prototyping and test infrastructure equipment in an Advanced Powder Metallurgy Centre (APMC) to promote industry adoption and investment.

- Build industry capability, stimulate NZ business participation, develop international relationships and export strategies for high tech manufacturing using titanium powders. This will be done in association with the Titanium Industry Development Association (TIDA) who will provide development of industry protocols, communications and marketing functions, access to expertise and facilitate industry development projects; and in-market demonstrations proving powder capability, consolidation technique and product development.

- Facilitate the wider industry needs, including coordinating a national R&D strategy and assisting in the attraction and training of skills, (in association with TIDA).

Although not listed as an objective as such, it is expected that further spillover/agglomeration benefits may result from international firms settling and moving their production of titanium products to New Zealand.

Net economic benefit

NEB has been estimated by NZTE, using the NZTE NEB calculator and Updated Manufacturing Multipliers for 2007/08 prepared by Berl Economics for Industry Capability Network, February 09. The cumulative increase in export revenues is $1.55 billion over 10 years. The calculation used:

- a 10 percent discount rate
- an industry value add of 54.4 percent
- a medium NZTE attribution ratio given in the NEB calculator (37.5%)
- an industry multiplier of 2.4, which includes indirect and upstream effects using a multiplier 1.85 (all multipliers used are conservative and exclude induced effects).

Activities

The following table prepared by NZTE describes the evolution of funding for the titanium ET SI. There is a clear progression from funding roadmaps and scoping

papers to support for the industry association TIDA, an advanced powder metallurgy centre and industry development projects. As one would expect with this sort of progression, the amount of funding has increased from $90 K in 2006/07 to $990 K in 2009/10.

Table 7: Funding for the titanium ET SI

NZTE (ex GST)	NZTE SI (06/07)	NZTE SI (07/08)	NZTE SI (08/09)	Trilateral (08/09) (vote MED)	NZTE (09/010)
Technology Roadmap	90K	$62K (Road show)			
TIDA coordination			$75K	$6K	$200K
Advanced powder metallurgy centre		$66K (scoping study)	$45K (business case)	$26K (PWC audit)	$600K (lease of facility)
Industry development projects		$20K (finding alternate supply of reductant)	$20K (nozzle design with MIM capability)	$255.8K (industry access to testing equipment & standards design) $290K (industry access to Laser sintering) $1.8K (Milling jars for Ti Testing) $31K (training package for laser sinterer)	$190K
Total SI	**$90K**	**$146K**	**$140K**	**$610.6K (not NZTE)**	**$990K**

In order to facilitate cooperation and collaboration within the fledging Titanox powders applications industry, NZTE support the establishment of an industry association, the Titanium Industry Development Association (TIDA). Its role is to help New Zealand titanium applications producers to adopt new technologies to be able to make use of the new alloy powders, to expand their overseas market shares and to open up new markets. TIDA is tasked with developing and implementing a plan for growing the industry's critical mass and capability. NZTE's goal for TIDA is to support it in its initial stages so that over time as the industry expands it becomes self-sustaining.

Up until the date of this evaluation, there were four firms that have projects based on the new titanium alloy powders and that have benefitted from TIDA's activities. We understand that since the work was undertaken for this evaluation, there are now more firms undertaking product development investigations and a total of 33 firms are involved with TIDA. A new test facility is also planned to be available to all the industry, thereby benefiting a wider pool of companies.

The titanium powder processing technology, and products and applications that use the powders, need to be analysed, tested and certified. The equipment needed for

doing that and access to it are costly. Consequently, NZTE have concluded that the fledgling industry is not in a position to fund these activities itself. In order for these to be able to test and certify their products and to attract more firms into this industry, NZTE provide $600 K of funding to TIDA, which is in addition to the $200 K funding TIDA receive directly, to support the establishment of an Advanced Powder Metallurgy Centre (APMC). This funding is to be used to buy access time and to lease the testing facility owned by the Bay of Plenty Polytechnic which invested $3 m capital. A further $190 K was spent on industry development projects.

Analysis

Government support for new technologies

Niche manufacturing in one way or another has been a target of the various forms of sector policy over the last decade or so. Successfully establishing new technologies and building new industries around them is one way in which innovation can take place. Innovation is at the core of every developed (and developing) country's industry policy. ETs in general operate in this area, which include support for a fledgling titanium applications industry.

One of the main justifications for sector policy is that government intervention may be able to generate wider benefits, or positive externalities (spillovers), that the market on its own does not produce. NZTE's support for the establishment of a titanium alloy powders applications industry is aimed at generating these wider benefits. NZTE Board Papers allude to the generation of spillover benefits by creating a titanium applications industry around the alloy powders, but it is not clear that this rationale has formed the basis for designing the intervention. The activities that NZTE support focuses on are meant to benefit the industry and not only individual firms. Funding the establishment of an industry organisation and the APMC seem appropriate interventions.

Discussions with key NZTE officials and a review of supporting documentation shows that NZTE are thinking about scaling down the support and advice as TIDA membership and expertise grows. Although a concrete exit strategy with milestones and timelines does not exist, it may be premature to have one at this point in time given the early stage of the industry's development.

Similarly, the APMC support provides the fledgling industry with subsidised access to testing equipment. NZTE internal papers recognise that a more mature industry would be expected to pay for these services.

Support for these interventions comes from the titanium powder report that lists them in a range of public interventions (totalling $110 m) that are required to create a titanium powder applications industry in New Zealand.

Generating net economic benefit

Whether building a new industry around Titanox's alloy powders generates a net economic benefit for the New Zealand economy depends on a number of things. The NEB calculations presented above are an attempt at establishing the potential

magnitude of that economic benefit for New Zealand. While we acknowledge that a variety of evidence will have been used to make decisions[28], the NEB calculations do not appear to adequately capture all the costs associated with the establishment of the industry. Moreover, the use of multipliers for calculating the NEB at the national level is misleading.

Unless the resources needed for establishing the new industry are currently unused, there will be economic activity that is currently taking place which the new titanium applications industry will displace. That economic activity, including value added and export revenue earned, will be foregone. The titanium powder report argues that 'titanium powder will be adopted alongside rather than to the exclusion of other materials' and that 'many staff will be involved with the production of different products and different materials', meaning that 'it is almost impossible at this time to separate out new employment from ...existing staff'. But if this is true, then unless staff and capital are currently idle, which is unlikely, the use of other materials and the products produced that way will be foregone. It is not clear whether these costs have been included in the NEB calculations and what assumptions have been made in regard to the value of the economic activity that will be foregone.

The use of economic multipliers at the national level is problematic. Economic multipliers calculate the flow-on economic activity that results from an increase in spending. If a titanium applications industry were to emerge in New Zealand, the multiplier effects calculated above show the flow-on economic activity resulting from the expenditure of that industry and the people it employs (assuming all other assumptions are correct). Unless there is spare capacity in the economy, which is highly unlikely, there will only be a positive NEB if employing the resources in the titanium applications industry produces greater returns than if they are employed elsewhere. It is not clear that the NEB calculations are truly net calculations. A more robust analysis of economic impacts would be based on a general equilibrium model.

NZTE are taking steps to improve the robustness of its methodology for measuring economic benefits (see box 1 below). We understand that since the work was undertaken for this evaluation, there is emerging evidence of wider spillover benefits occurring through international firms settling and moving their production of titanium products to New Zealand. We are not able to verify or quantify the extent of this in this evaluation.

Box 1: NZTE is improving its method for calculating the economic benefits from activities

Direct Economic Impact estimates

NZTE are taking steps to improve the robustness of its methodology to estimate economic impact from its activities.

To better guide resource allocation, and channel staff time and resources into areas that give the greatest return, NZTE is replacing the potential Net Economic Benefit (NEB) methodology with Direct Economic Impact (DEI). DEI is a longer term measure (three to five years) and reflects the time lag between NZTE activity and the impact being realised. It is one of several performance measures for NZTE.

[28] Including KMatrix reports.

Key elements of DEI are that "New Zealand Inc." is the unit of analysis; the sources of benefit are additional profits to New Zealand, spend on salaries, wages and suppliers; and scenarios are considered with/without the intervention. The analysis is limited to participating firms and their direct suppliers and employees, with wider spillovers generally included in "soft" measures and commentary. The depth of the DEI analysis will often be related to the size of NZTE's investment.

Successful implementation of DEI is a progressive exercise over multiple years as NZTE learns about what works well and what is realistic to implement.

Rationale for an applications industry in New Zealand

It appears that the focus on actively supporting the emergence of an applications industry has developed over time and may not have been at the core of NZTE thinking, and hence the intervention, right from the beginning. The road map study, commissioned by NZTE and Titanox Development Ltd and produced by Knibb, Gormezano and Partners[29] (KGP) in 2007, contains a great deal of analysis on finding ways of commercialising the new titanium alloy powders developed by Titanox. It does not contain an analysis of why it should be in New Zealand's economic interest to have a titanium applications industry, the potential costs and benefits of that and, most importantly, the role of government. One may even get the impression that that due to the difficulties for the new powders of breaking into markets jealously guarded by incumbents, having a New Zealand applications industry could be a good way of generating a demand for them[30].

The more recent titanium powder report attempts to rectify this. Discussions with NZTE staff and NZTE documentation show that capturing the benefits of the value chain for New Zealand are now at the core of NZTE thinking. The titanium powder report provides detailed information about the task at hand. According to the report, 'the experience in NZ in terms of powder metallurgy is weak and few of those with expertise in NZ were trained here.' Skill shortages are mentioned as a key area to address, as is public investment. While the report believes that the long term benefits of having a titanium powder applications industry outweigh the costs of investment, it also acknowledges that the industry would have to be built up from scratch and that this has not been done before in New Zealand. Essentially, it argues that what is required is a government wide approach that plans the development of the industry for the next 5 to10 years.

The report sees public investment as an alternative to private equity and venture capital. According to the report, the alloy powders were now at a stage at which they could easily attract private equity. Public investment, according to the report, was needed to prevent this from happening as there was a greater risk that with PE investment the technology could go abroad. The report furthermore recommends that supplies of Titanox be secured early for NZ firms by government doing one of three things (or a combination thereof): taking a strategic interest in Titanox; agreeing

[29] 'NZ Titanium Alloy Industry: Technology Route Mapping Project' Knibb, Gormezano & Partners, 2007.

[30] We understand that the KMatrix reports contain an analysis of why it should be in New Zealand's economic interest to have a titanium applications industry. These reports were not provided to us at the time of the evaluation.

a supply arrangement; or a loan to Titanox Ltd to give government/NZ customers preferential treatment.

While there could be competition from abroad as others were also engaged in developing titanium alloy powders, the Titanox process is seen as more advanced. Potential competitors were unlikely to catch up in the near future. What these arguments demonstrate is that the support required for creating a titanium industry in New Zealand goes beyond addressing some market failures. It is about creating an industry from scratch by planning its development in terms of investment, skills and securing supplies of the alloy powders for potential NZ producers. NZTE has one role in this but other government services and organisations are also clearly needed to make it happen.

The decision as to whether New Zealand should invest in planning for and creating a titanium powder applications industry seems to go beyond making an operational decision about alleviating a problem in the functioning of a market. It is a policy decision[31]. The separation of tasks between MED and NZTE foresees MED developing policy and NZTE implementing it at the operational level. Discussions with MED officials have revealed awareness about the ETs, including titanium alloy powders, but no direct MED involvement in making the decision and assessing the benefits and costs of such a policy for the NZ economy.

Although the lines between what constitutes policy and operational activities are not always clearly demarcated, it is reasonable to view the planning and the use of public resources for the development of a whole new industry as more than an operational intervention. The recommendation made by the previous evaluation in 2006, namely that NZTE and MED should more closely collaborate, could add value in this situation. Both organisations share responsibility for overcoming these inherent weaknesses of the crown agency/entity model.

NZTE note that as part of the trilateral process between NZTE, FRST and TEC, MED was consulted on the decision to invest in planning for and creating a titanium applications industry. However, we consider that in this case, MED's involvement should have been greater.

Table 8: NZTE's Updated Information on Outcomes for this SI

Over the past nine months $9 million of private capital has been invested with significant more planned. NZTE's $600 K per annum for development costs over three years has encouraged this risk-taking. • Two NZ companies procured in new powder processing technologies; Laser sinter and a powder coating machine (estimated capital value $2 m + development costs). • A new company has been established to process titanium foam opportunities for medical markets (total investment approx. $3 m per year for five years). • 13 potential product development opportunities have been investigated by industry and another six are in development. Two new products have progressed to in-market testing off-shore. All

[31] Titanox formed part of a high-level multi-sector initiative to Ministers from NZTE, FRST and TEC which did not include detailed policy analysis.

companies involved are seeking new methods/materials to produce innovative new designs that are not possible using current technologies.

- Bay of Plenty Polytechnic has built an Applied Powder Metallurgy Centre (capital $3 m) in partnership with TIDA. This facility provides industry access to specialist analytical and test equipment, technical know-how and facilitates access to commercial scale prototype capability. TIDA has employed two technologists to operate the equipment and provide the technical expertise for customer requests/projects.
- Five new FTEs have been employed by industry as a direct result of new titanium activity.
- Industry awareness and understanding of TIDA as a conduit of information has significantly increased. A total of 33 companies are involved with TIDA. International interest in the titanium project is growing and momentum is building.
- Waikato University investing directly in new powder processing equipment and provide resources to support new industry development ($100 K not funded by any other government means, ie TEC or FRST).

Source: NZTE collated information

Conclusion

The rationale for supporting titanium powder development in New Zealand seems to have evolved over time. The current reasoning underlying public support contains a number of the arguments on which sector interventions are generally based. Targeting spillovers and focusing support on horizontal activities rather than individual firms is appropriate and in line with best practice, as is thinking about an exit strategy.

However, the public support for titanium powders goes beyond addressing market failures. It is about creating a new industry in New Zealand in an area in which we have little real expertise. Underlying studies show the planning in terms of skills, market information, domestic demand and public investment that needs to take place. It should be recalled that the argument for public investment is not necessarily a lack of private investment to help Titanox powder grow, but rather that private investment is seen as a risk that needs to be crowded out, or at least controlled by public investment. In this context, the absence of a proper analysis of the costs and benefits that takes into account opportunity costs of having a titanium applications industry in New Zealand is somewhat disconcerting. It should be stressed that the use of multipliers (that do not take into account opportunity costs) at the national level does not constitute a proper NEB calculation. Such an analysis is better done within a general equilibrium framework.

It is also hard to see how the development of a new industry does not require the direct involvement of those responsible for developing policy advice, particularly given the wider (positive and negative) implications of such an undertaking. At a minimum this would require much closer collaboration between MED and NZTE, something for which both organisations are jointly responsible. NZTE have indicated that they would welcome such closer engagement.

It is currently not possible to reach an informed judgment on whether investing in the development of a titanium applications industry is in the economic interest of New Zealand, and therefore good use of taxpayers' money. While it may be true that the

value added of the alloy powder lies in other parts of the value chain, developing such an industry in New Zealand requires substantial public investment and may require resources that are currently employed elsewhere. The case as to why they should better be utilised for making appliances that use Titanox's alloy powders has yet to be made.

5.4 High Temperature Superconductivity

Background

High Temperature Superconductivity (HTS) is a new technology. It conducts electricity more efficiently than copper and can form powerful electro-magnetic fields. The technology works at very low temperatures (cryo). Its main technology competitor is Low Temperature Superconductivity, which operates at close to absolute zero and was established after WWII. HTS equipment is used in a number of scientific and industrial applications from medical imaging to magnets and geological scanning. Most of these products are considered to be high value added.

Research carried out in New Zealand has been funded with public money through the Foundation for Research, Science and Technology (FRST) for more than twenty-five years. The work done by scientists in New Zealand is seen to be at the forefront of international research into HTS technology, although other countries are also actively competing in this area[32]. Key New Zealand discoveries have been globally patented by Industrial Research Ltd (IRL).

NZTE's role is not to support the background research but to help bring the technology to market[33].

The industry is currently in its early stages both in New Zealand and abroad. In New Zealand, some firms are taking advantage of IRL's scientific and technological knowledge in HTS. HTS-110, founded by IRL in 2004, produces HTS magnets and current leads. Its other main shareholders are the American Superconductors Corporation (AMSC) and venture capital firm Endeavour Ltd[34]. They have established a leading position internationally with certain products (high-field commercial HTS magnets and nuclear magnetic resonance systems for industrial process control applications). Other new products are in development.

General Cable Superconductors is a joint venture between IRL and large American firm, General Cable that has been established to manufacture 2nd generation HTS cable in Christchurch. General Cable has a global distribution network in the

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[32] See for example http://www.superconductors.org/254K.htm

[33] It should be noted that our analysis is limited to NZTE involvement in HTS. It does not extend to the funding for applied research and development HTS receives from other organisations such as FRST and TEC.

[34] HTS-110 designs and manufactures HTS magnets and components for demanding scientific and industrial customers throughout the world.HTS-110 products work in tougher environments, are smaller, lighter and more energy efficient than competing solutions. The range of magnetic products are designed by an internationally-sourced team of magnetic, cryogenic and mechanical experts. HTS-110's key products include:

- Magnet systems from 1 to > 16 tesla
- Desktop NMR systems from 100-200MHz, for on- and off-line material analysis
- Optical analysis magnets for surface analysis and characterisation
- Magnets for synchrotron and neutron beamlines
- Low heat-leak Cryosaver® Current Leads for LTS applications, rated from 100A to 10kA+

See http://www.hts110.co.nz/our-company/.

electricity generation sector into which this new technology has several potential applications.

NZTE advise that 'a value chain of high performance companies are growing up around these two firms…some New Zealand companies such as Mace Engineering are building new export markets…'and 'Multinationals such as General Cable International, American Superconductors and Siemens AGF are directly investing in New Zealand Industry'[35]. IRL have similarly identified a number of firms whom they are collaborating with to develop applications for HTS technology[36].

Studies commissioned by NZTE indicate that the global market for HTS applications may be approximately US$600 million by 2015, and increasing rapidly thereafter. They suggest that New Zealand could capture 30 percent of the 2015 market ($US 200 million) by 2015[37]. NZTE have qualified this figure given slower developments than foreseen. This has been attributed by NZTE at least in part to the recent recession. As sales in 2008/09 were only US$4 m by NZ firms, NZTE now views a target of 20 percent of the market, ie US$120 m by 2015, as more realistic. However, it is also argued that for that to happen more public and private investment is needed and these figures are not net of any foregone production that transferring resources to the HTS industry would entail.

The main rationales supporting NZTE involvement as part of a Strategic Initiative appear to be around reaping spillover benefits from an HTS applications industry. The main benefits of HTS technology to New Zealand are seen to be in manufacturing the applications in which it can be used. But the 'information problem' is that potential manufacturers are not familiar with the new technology and might not make the necessary investments.

The spillover rationale is complemented by an infant industry-like argument stressing the need for market demonstration of the new technology and support for access to finance, industry coordination and overcoming information issues due to the small size of the industry and its constituent firms. The essence of this line of argument is that the industry will be competitive once the initial hurdles are overcome but that in order to do so it will require early stage government support.

Neither rationale has been fully spelt out in the documents we have seen. The justification for government intervention as explained here reflects our understanding based on background papers and discussions with key NZTE staff.

The list of objectives we have established is based on a review of NZTE documents and discussions with NZTE officials. A unified and clearer list of objectives linked in with the intervention rationale would have been desirable.

The main objective appears to be to build an HTS applications industry that can generate export revenue and contribute to economic growth as a high value added industry.

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[35] NZTE have informed us that Mace Engineering is no longer involved.
[36] See http://www.irl.cri.nz/working-us/impact-case-studies/hts-impact-case-study.
[37] Knibb Gormezano & Partners (2008) for the Trilateral Agencies and Acuity Partners (2007) for NZTE.

A further objective of the NZTE support should be to facilitate the New Zealand HTS applications industry achieving a global market share (based on sales) of five percent or US $120 m by 2015.

The more direct objectives appear to be:

- to support coordination and leadership within the new HTS industry
- to support market development activities
- to facilitate international relationships.

Net economic benefit

A factor influencing the Strategic Initiative was the NEB analysis. This indicated a NEB of NZ$602 m over the next ten years. This figure was calculated by the NZTE NEB calculator and assumed:

- a NZ share of the global market of US$120 m (20 %) by 2015, then rising to US$400 m by 2019
- a 10 percent discount rate
- an industry value add of 54.4 percent
- an NZTE attribution ratio of 37.5 percent
- an industry multiplier of 1.8.

The previous section on the NEB calculations for the titanox project contains a discussion of the inadequacies of calculating an NEB that does not take into account opportunity costs and relies on multiplier effects at the national level. The same arguments apply to these NEB calculations. Unless a new HTS industry in New Zealand would utilise currently idle resources, it is likely that these calculations overstate the true NEB. NZTE have indicated that they now intend to apply more conventional cost-benefit methodology to such analysis.

We appreciate that a variety of evidence is used in making decisions. In this case, external studies were commissioned by NZTE and FRST.

Activities

The $350,000 in funding, with additional private sector funding, that goes to assisting the HTS applications industry in 2009/10 is to be spent as follows:

- $95,000 to support the HTS industry association to provide coordination and leadership for the fledgling industry. This funding is expected to be matched by the private sector on a 50:50 basis. The association recently hosted an international conference[38]
- $120,000 to support HTS 110 growth in magnetic systems (from bespoke operations, building key international relationships and distributorship in Europe and assisting with demonstration of new MRI and other products

[38] International Superconductivity Industry Summit see http://www.istec.or.jp/Isis/activityE.html.

- $55,000 to support Mace/HTS 110/Air Liquide structure joint venture arrangements and establish new company arrangements relating to production and marketing
- $80,000 to assist General Cable Superconductors and associated industries (ie firms) with market development and demonstration projects.

Analysis

Funding the establishment of an industry body to support the HTS industry with industry promotion or capital-raising seems like the right 'horizontal' support that NZTE could usefully provide to help get it off the ground. It is highly unlikely that the industry association would exist without NZTE support. Furthermore, proof of concept studies and market validation also seem appropriate in order to help the industry grow and achieve critical mass.

NZTE have worked with IRL and individual firms to help establish new products in the market. This included both financial assistance for product development as listed above, and in-market networking.

All stakeholders have acknowledged the contribution NZTE has made arguing that the HTS industry in New Zealand would not be where it is today without NZTE involvement. One stakeholder in particular thought that NZTE support had been perfect and that there was nothing NZTE could do better or should change.

Other stakeholders thought that NZTE should focus more on funding market 'demonstration' projects, such as proof of concept and studies that genuinely analysed the global market for HTS. Such work was seen as being desirable to help 'de-risk' investment in HTS technology or manufacture of its appliances.

There was also a view that current market studies and road maps commissioned by NZTE did not give private operators sufficient confidence to invest in HTS. It was suggested that they contained too many assertions and not enough robust objective evidence of relevance to New Zealand.

For New Zealand business, there appeared to be some doubt as to whether HTS could really become a significant industry in New Zealand due to a lack of market validation and the resources that competitor countries, such as the US and Japan, 'could throw at it'. Further developments in the technology require New Zealand to have an ongoing world-class research capability and technological ability. The emergence of 2nd generation HTS technology in the US and other more recent developments have served to further highlight the global competitive pressures in this area.

Local manufacturing capability and the supply of skilled staff were further obstacles that needed to be overcome if New Zealand was to become a centre of HTS appliances manufacturing.

The first road map, in 2003, alluded to the lack of current manufacturing capability for HTS but stressed that New Zealand had firms that could potentially make HTS products. This point is directly relevant for the NEB calculations (see above) as it confirms that resources would have to be taken away from somewhere else and that

the true NEB consists only of the added value that HTS products offer over and above those that these firms would have produced otherwise. To our knowledge, this has not been investigated by NZTE or in any of the studies that have been commissioned on HTS. A second road map, in 2007, sought to provide a further assessment of global opportunities.

However, these views were challenged by other stakeholders who were convinced that HTS could make a significant contribution to the New Zealand economy provided government investment continued. They also argued that HTS could provide a boost to NZ manufacturing by offering work for companies that otherwise could go out of business due to competition from emerging economies. The veracity of these claims could not be established so far.

It appears that the road maps and market validation studies were written to scope the global market and to identify what public investment is needed for our HTS knowledge to be brought to market, but not to address the question of whether New Zealand should have an HTS industry and what the likely costs and benefits of that would be. (One author of the studies told us that that was never the objective of his study).

While working through individual firms might be appropriate at this stage of the HTS industry's development, the absence of clear success criteria and timelines explaining when support will be scaled back is missing. This is especially important now that, as NZTE has reported, some companies may be "moving towards being mainstreamed" ie developing a more clearly established market position.

Conclusion

As with other emerging technologies, HTS is characterised by a high degree of uncertainty. Clearly, there is some emerging business activity in New Zealand that is strongly linked into both IRL's substantial HTS scientific knowledge, and some key international business opportunities. However, it seems that not all key stakeholders fully subscribe to NZTE's positive outlook for HTS. Some of this doubt appears to relate to previous projections of the size of the global market and the ambitious estimation of opportunities for New Zealand based firms.

New Zealand's experience in high-technology manufacturing has been uneven due, not least, to issues of scale and distance from markets. HTS technology can take substantial investment and a decade or more to design, develop, proto-type and test in the market. Robust and objective information to be confident of a positive outlook does not yet exist. The possibility of new investment to scale-up some production and of new investment interest to test potential new product and other market opportunities is nevertheless very promising.

Given both the large government investment in HTS and its potential applications, it makes good sense for NZTE to help facilitate sector development opportunities for New Zealand where they are supported by robust analysis.

Until now, the approach has been largely based on an infant-industry-like argument. NZTE grants have assisted certain initial product development and business networks as well as the industry association. (This work has been undertaken

alongside government support for early-stage business investment through the venture investment fund).

With some substantial commercial investment, including by multinationals, having been made the NZTE focus will need to shift to the generation of spill-over benefits for New Zealand. The generation of spill-over benefits from NZTE's HTS work may emerge if other entrepreneurs and firms in New Zealand are able to leverage the IRL and HTS-110 success. The cryo-cooling process required for HTS is seen as one such potential spill-over opportunity. It has potential use in liquefaction of gases for emergency medicine applications.

Work to date has not fully examined the wider question of whether HTS is likely to produce a NEB for New Zealand. The calculations based on the NZTE NEB calculator are limited for the reasons stated in the section on titanox alloy powders, above. It should be acknowledged, though, that supporting the formation of an industry association and funding proof of concept/market validation work remain appropriate targets for public intervention.

6. Findings: The Health Strategic Initiative

This chapter presents and discusses findings on the Health Strategic Initiative.

6.1 Objectives of the Health Sector Strategic Initiative

The Health Strategic Initiative has been running since 2007/08. Since 2007, $9.02 million has been approved for spending on the Health Strategic Initiative. The actual amount spent, as shown below, was significantly less than the amounts approved.

- 2007/08 - $1.565 m spent
- 2008/09 - $1.691 m spent
- 2009/10 - $1.751 m (forecast).

The Health Strategic Initiative is made up of three priority areas – health IT, medical technologies, and bioactives. NZTE's has stated the following objectives for the Health Strategic Initiative.

- *Promote internationalisation* - promoting New Zealand's capability internationally and addressing internationalisation challenges, particularly with market intelligence and networks.
- *Build industry capability* - helping New Zealand health companies to be competitive in the long-term in international markets.
- *Strengthen the environment for health innovation and commercialisation* - developing strong connections within the sector.

NZTE's objectives for the Health Strategic Initiative have been developed through a combination of analysing internal NZTE information and consultation among industry and supported by commissioned research. NZTE informed us that objectives for the initiative are determined by observing a collective need or challenge for companies across the sector. NZTE determines activities to run, based on its strategic observations around what would be useful for the sector. Observations are gained through consulting staff in off-shore offices, local staff with health sector knowledge, and by examining individual client engagement plans to identify common needs and common priority markets across firms in the sector (such as Europe, Asia, Australia etc).

NZTE also ran focus groups among clients in 2008 to gain feedback on potential strategic initiatives, and to identify barriers to growth for firms in the sector. This was a one-off process to inform planning for the SI.

6.2 Analysis

Intervention rationale and opportunities for growth

In 2007, Cabinet agreed [39] on 'Areas of Focus to Support Economic Transformation'. One of these was health solutions, which included focusing on developing and implementing technology enabled healthcare solutions to deliver future savings, benefits and niche global market opportunities across health and 'wellness'. The Cabinet Paper outlines proposals for a joint targeted approach to these areas by the relevant government agencies, including the Ministry of Economic Development, the Tertiary Education Commission, the Foundation for Research Science and Technology, and NZTE.

The Cabinet paper notes that New Zealand has a number of health-related industry groups and clusters in New Zealand that can drive the ongoing collaboration needed to promote health solutions as an area of focus for the New Zealand innovation system. They include:

- The Health IT Cluster (collaboration between government and high growth health IT firms).
- The Medical Devices Cluster (a special interest group for NZBIO which includes several firms).
- Natural Products New Zealand (an industry group comprising several companies).

The Cabinet paper acknowledges that Government and business both have an interest in this area:

"Governments, healthcare providers and consumers are all looking for ways to achieve better health outcomes for reduced cost. In conjunction with the search for better efficiency in delivery, expenditure on health continues to rise faster than GDP and inflation (eg health expenditure in the United States was 16 percent of GDP in 2005, but is forecast to be 20 percent of GDP by 2015). There is a strong emphasis on the idea of 'wellness' as opposed to disease management."

The Cabinet paper considers that government intervention can create spillovers by encouraging collaboration across sectors (eg between healthcare and advanced food). The paper considers that while New Zealand companies have some history of collaboration within sectors, collaboration across sectors is not as well developed. It suggests that government can play a role in enhancing collaboration between the wider health sector and the commercial sector, as well as aligning government investment in health-related activity. Some spillovers that the paper considers could come out of increased public sector focus in this area include:

[39] POL (07) 337.

- Increased talent flow to New Zealand due to recognition of New Zealand as a centre of global excellence in health care.
- New business models based on a collaborative model which will be applicable beyond the health sector.
- Higher productivity and reduced health costs due to improved health outcomes for New Zealanders.

Prior to 2007, NZTE had been supporting collaboration, market development and capability building in the health IT sector through supporting the Health IT Cluster to facilitate collaboration among health software companies (including Microsoft)[40]. NZTE's health IT project started in 2006, and has helped support collaborations led by the Health IT Cluster, developed relationships in the New Zealand health provider community, and assisted health IT companies to expand into new markets, including increasing a presence in Canadian markets. The project undertook preliminary work for the Health Strategic Initiative, including identifying potential issues for NZ Health Inc, scoping trends and opportunities in key international markets, and making preliminary contact with stakeholders in the health sector (including MoRST, FRST, Universities of Auckland and Otago, and IRL).

Since NZTE implemented its Strategic Initiative in July 2007, it has commissioned a number of reports to analyse international markets and opportunities to identify the extent of potential for growth in this area. There is an established consensus that the health innovation and technology sector offers potential growth opportunities for New Zealand. For example, The LEK report, the AERU and Flicka report, and the Coriolis Healthcare "Health Industry Growth Framework" identify combined revenues of over $1.4 billion, with additional growth potential of at least another $1 billion in 5 years time. New Zealand's annual investment in health delivery and research is estimated at around $12 billion annually. Some of the increased potential revenue has been estimated to lie in innovative collaborations between the health IT industry and the health sector[41].

NZTE commissioned reports, noted above, identify a number of barriers to growth, and estimate that should these barriers be overcome, revenues for some areas could be increased. These are approximate estimates, but there does seem opportunity for New Zealand to increase its share of the growing international health services and technology market.

NZTE has identified from these reports, and based on input from firms within the sector, that the barriers shown in Table 9 need to be addressed through the Health Strategic Initiative. The table shows NZTE's actions under the Health Strategic Initiative, for 2009 onwards, to address these barriers.

[40] Such as the Collaborative MS project.
[41] Coriolis Healthcare (2009): Health Industry Growth Framework Phase 1a.

Table 9: NZTE has identified barriers to growth for the Health sector

Barrier to growth	NZTE actions	Difference NZTE will make
Inadequate international networks eg end-user/buyer; partners, capital	International market and business development programmes, eg international missions	Faster and bigger
Complexity of international markets eg understanding regulatory requirements and reimbursement models in key markets	International market development programmes eg webinar series; market development workshops	Faster and bigger
Small scale and low capability of NZ players by international standards	Business matching programmes attached to international missions Industry capability workshops and seminars	Faster
Poor linkages between domestic health sector and industry	CEO Forum Health Innovation Summit Innovation Challenge	Faster, bigger, better and more sustainable
Lack of early stage funding for prototype development, proof of concept and clinical trials	Linking businesses with potential sources of capital eg Innovation Challenge Working with other agencies eg HRC, MED, MoRST to secure funding Facilitating linkages between health sector and industry eg CEO Forum	More sustainable
Lack of key infrastructure eg access to reference sites/clinical trials/end users; supportive regulatory environment, procurement policy	Facilitate development or access to infrastructure (eg one-stop clinical trials bioactives, clinical trial guidelines for medical technologies, certification testing for Health IT, access to international facilities) Support development of regional health innovation hubs linking the health sector with industry Influence Government policy	Faster, more sustainable

Source: NZTE Board paper 2009 (note NZTE's board paper 2007 contains an earlier version)

NZTE informed us in interviews that their focus for the Health SI is determined by the opportunities for growth that NZTE considers available, and how NZTE might help overcome any barriers to achieving greater growth. NZTE thinking is strategic and oriented towards accelerating successful business outcomes. NZTE consider that

the actions achieved by firms through NZTE assistance, would probably happen anyway but are assisted to occur quicker by NZTE assistance.

As outlined previously in this report, there is a balance that government is required to draw between interventions that crowd out solutions from the private sector, attract rent seeking by firms, and insufficient support to address market failures. In developing an approach to the SIs that focuses on opportunities, NZTE needs to avoid intervening beyond the point that is necessary for government. For example, firms may find it difficult to understand the regulatory framework in international markets, but it is possible for them to solve this barrier by paying for information on these markets. It is not necessarily required for government to provide this information for firms.

The rationale for government to address these barriers identified by NZTE is not clear, as the health SI does not currently focus on a market failure framework. Demonstrating value for taxpayers' funds becomes difficult when firms could reasonably be expected to pay themselves for some of the activities provided by NZTE, to help them overcome barriers to business development. If there is clear potential for growth and returns to firms, it is not clear why government should subsidise activities that firms themselves would be willing to pay for, and reap the private benefits of. Alternatively, there may be existing bodies or organisations that are able to coordinate activities to address the types of barriers identified in the table above. It is not necessarily required that government duplicate existing efforts to solve sector problems. We have not seen evidence that clearly proves the necessity of government intervention in these areas.

Alignment of activities with objectives: NZTE projects could better focus on 'sector outputs'

The Health Strategic Initiative has consisted of a number of activities to achieve its main objectives. Table 10 shows the full list of activities for the SI stated in NZTE's board papers since 2007/08.

Table 10: NZTE activities under the Health SI since 2007

Name of NZTE activity			Description	Type of Activity
Bio Japan			International Tradeshow to promote NZ health solutions, focus on bioactives	Trade show
Innovation Challenge			Facilitates companies to commercialise NZ health solutions into the US markets through workshops and webinars	Market focused event
Health Ingredients Japan			Build on established profile of the NZ bioactives and natural product sector in the Japanese market	Trade show
Medica			Biggest International medical technologies tradeshow, promoting access to key international markets	Trade show
International Opportunities	**NAM Opportunities /Development**	**Bioactives Market Reach Programme**	Integrated marketing campaign using social media, online tools, webinar series	Training event
		AdvaMed	In-market mission, premier medical technology event in the US, involving NZ showcase and networking event	Trade show
	EMEA Market Development	**Arab Health**	In-market mission to regional premier trade show, includes networking events, business matching, and provision of marketing collateral	Trade show
		UK Health Technologies market Development Progarmme	NZ showcase/networking event delivered in UK	Trade show
		EU opportunities for NZ bioactive companies	Provision of webinar and seminar series	Training event
		Australian Market Development	Programme includes a webinar series covering all three technology sectors, program to leverage NZTE's strategic relationship with the centre for health and innovation and provision of market intelligence for NZ firms	Market focused event
	Asia Pacific Market	**Thailand Health**	In-market business mission for	Market

Name of NZTE activity			Description	Type of Activity
	Development	**IT**	NZ Health IT companies focused on key Thai private hospitals	focused event
		Japan Health IT	Joint programme with Investment NZ leveraging relationships with Mitsubishi FJ, NTT Data and wider sector	Market focused event
		HiMMS Asia Pacific	Joint programme with Austrade at regions largest health IT conference	Market focused event
	Indigenous Health and BC Health Mission		Indigenous Health forum, evaluation of NZ capability and NAM Indigenous Health Market completed	Market focused event
	Canada e-Health[42]		Forum focusing on health IT and technology innovation	Trade show
	Vitafoods[43]			Trade show
	Italy CIO Forum		Strengthening relationship with leading Italian Players in healthcare system, influence in the EU Health IT area, involved forums and meeting key advisors	Market focused event
NZ Health Inc	**Medical Technologies**		Contract for services for the provision of workshops and other activities that address the issues identified in the AERU/Flicker Medical Technology sector report on regulation, procurement and further strategic industry development	Support to industry body
	Bioactives		Support of Natural Products NZ International Conference, to address barriers identified by LEK report, development of infrastructure for clinical trials	Support to industry body
	Health Industry Growth Framework		4 NZ companies, DHB, IPAC, HRC, Auckland Uni to construct forum panel, build linkages between the health sector with industry	Support to industry

[42] This initiative did not proceed as planned due to reconfigured priorities.

[43] This initiative did not proceed as planned due to reconfigured priorities.

Name of NZTE activity		Description	Type of Activity
	Health IT	Provision of support to address current Health IT industry issues including certification and co development	Support to industry body
Health Summit	**Strategy Development, Regional Workshops**	NZTE hosted a Health and Innovation CEO Forum for leading DHB and industry CEO to agree on a vision for NZ health innovation and next steps	Networking and capability building event

The activities fall into five main categories, with the majority of the activities falling under the tradeshow and market focused event category. Table 11 below shows a breakdown of the number of activities that fall within each category.

Table 11: Types of activity within the Health SI

Type of activity	Number of this activity under the Health SI
Trade shows[44]	9
Training events, including webinars	2
Networking and capability building events	1 (plus informal networking attached to trade shows and other events)
Support to industry bodies or sector organisations	4
Market focused events or activities to develop business and relationships for firms in countries of interest (such as Australia, China, Thailand, Italy, North America, Japan etc)	6
Total	**22**

As shown in the table, a large number the activities under the Health SI are trade show events and market focused activities. These types of activities provide business development benefits to firms. NZTE have commented that trade shows within the Health SI have also been about sector outputs (eg NZ branding, capability building, and building networks).

It is difficult, however, to identify how these activities differ from the intended services offered to firms from other NZTE Output Classes[45]. As outlined above, Output Class

[44] NZTE also uses the term showcase. Trade show will be used in this section of our report as a summary term for both types of event.

[45] Output Class 3: Analysis and Development Services for Firms and Output Class 4: Identification and Coordination of International Market Opportunities.

2 activities are designed to provide projects that encourage wider benefits and spillovers to the economy, beyond direct benefits to firms involved. The Cabinet Paper outlined earlier in this chapter discusses the types of wider benefits and spillovers, such as new business models and collaborations, that are expected from government investment in activities in the health sector.

However, NZTE have told us that they do not identify or measure what wider benefits occur as a result of these activities. It is difficult to identify why these activities that focus on private business development for firms, should form the majority of activities within the Health SI.

NZTE could provide better value for money for Output Class 2 expenditure by focusing more of its activities and resources on outputs that are better designed to provide wider benefits to the sector. The Cabinet Paper, discussed above, outlines the types of activities that we would expect to provide sector-wide benefits and the types of results that government expects NZTE sector activities to lead to. Support to industry bodies or sector organisations are good examples of activities that provide a 'sector output', and later in this chapter we provide further examples of these.

Later in this chapter we discuss firms' views on the impact of these activities.

Benefits

NZTE has met and exceeded its performance measures for the Health SI

NZTE's performance measures for the Health Strategic Initiative were adequately completed in the 2007/08 year, and exceeded in the 2008/09 year. Table 12 shows a summary of NZTE's performance against the set performance measures for the Health Strategic Initiative.

Table 12: NZTE's completed performance measures for the Health SI since 2007

Performance measure 07/08	Measure met? 07/08	Performance measure 08/09	Measure met? 08/09
One or more collaborative health projects initiated by NZTE	Completed	Medica (Medical technologies trade show, Germany) and Health Ingredients (Bioactives, Japan) programmes (including business matching) completed with at least 10 companies participating in each programme	Exceeded
At least five NZ Health technology companies have made significant progress internationally (to be measured from results in increased export growth, new channels or in market	Completed	Targeted market and/or brand development programmes in at least two markets	Exceeded

Performance measure 07/08	Measure met? 07/08	Performance measure 08/09	Measure met? 08/09
presence established)			
n/a	n/a	Virtual Roadshow concept trialled in at least one market	Exceeded
n/a	n/a	NZ Healthcare brand positioning developed under Brand NZ and used in at least two activities	Exceeded
n/a	n/a	At least two projects aimed at developing industry capability (eg regulation, standards, preclinical and clinical trials, interoperability) facilitated by NZTE	Exceeded
n/a	n/a	Health Summit bringing the wider New Zealand health sector and commercial sector together held attracting at least 250 delegates	Exceeded
n/a	n/a	Health Innovation Challenge programme launched with at least 20 entrants	Completed and roll-over to 2009/10

Source: NZTE information

Note that performance for the 2009/10 year is not yet completed.

While NZTE has achieved good performance on the performance measures that it set for the Health Strategic Initiative, the performance measures set have not been particularly challenging. For example, the performance targets, even once completed, do not give an indication that approvals of $3.02 million for 2007/08 and $3 million for 2008/09 have been used wisely to achieve clear sector outputs or that these amounts are clearly required to meet the performance targets. For example, monitoring the number of companies attending a trade fair, or number of companies making progress internationally, does not demonstrate that the Health SI is achieving benefits across the sector.

Performance measures are one way of an entity demonstrating that it is delivering the intended outputs of a programme, and delivering value for money. NZTE could better demonstrate the value for money provided by Output Class 2 activities by developing more clearly relevant and 'SMART' performance measures.

A clearly worked through intervention logic for the Health SI would assist NZTE to develop performance measures that better demonstrate that Output Class 2 is achieving the goals that it sets out to achieve. Developing performance measures is one aspect of developing a clearly worked through intervention logic.

The impact and benefits of the Health SI to the sector are unclear

NZTE collated information

NZTE gathers standard information on the benefits that have arisen as a result of their activity. This information identifies the number of leads, deals and introductions provided to firms as a result of NZTE activity. NZTE uses this same framework to gather information on the impact of its Output Class 2 activities. For example, NZTE identifies the number of leads, deals and introductions that a trade show, such as Medica, brings to the firms taking part.

Measuring the leads, deals and introductions gained by firms at sector focused trade fairs only monitors the private benefits that firms reap from these activities. Wider benefits to the sector are not evident from this type of information. NZTE has informed us that it does not measure or monitor these wider benefits. To demonstrate that Output Class 2 provides value for money for sector activities, NZTE must do so.

NZTE's 2007 board paper for the Health SI notes in a number of places that collaborations are one of the main goals of the Health SI. The board paper also notes that spillover benefits and sector benefits are expected from these activities. NZTE's board paper notes that these include: new business models based on collaboration; sharing of ideas experience and knowledge; and increased use of new technologies. It is therefore not unreasonable to expect that these benefits should have been monitored and measured by NZTE. We have not been able to find evidence that does so.

NZTE provides estimates in its board papers of the Net Economic Benefit expected to arise as a result of NZTE activity. We discuss the difficulties of relying on these calculations in earlier chapters. NZTE does not measure whether these estimates of economic benefit have actually occurred. Table 13 provides a summary of NZTE's monitored achievements for the Health SI.

Table 13: NZTE's monitored achievements for the Health SI

Type of achievement	Examples	Extent of NZTE achievement in this area
Developed industry relationships	NZTE has facilitated an industry CEO Forum, Health Innovation Summit (in partnership with the Ministry of Health), and secured DHB involvement in the Innovation Challenge	Significant
Leads, deals and introductions provided to firms through NZTE assistance	Health Ingredients Japan 2008: over $4m worth of deals likely Medica 2008: over $6.5m worth of deals likely	Significant
Numbers of participants at events	Health Ingredients Japan 2008: 16 companies attended Medica 2008: 12 companies	Numbers of participants in sector activities could be increased

Type of achievement	Examples	Extent of NZTE achievement in this area
	attended	
Satisfaction surveys of firms attending events	Firms frequently provide high satisfaction ratings on NZTE organised events	Significant
Media mentions	NZTE achieves frequent mentions in media reports, with high amounts of Equivalent Advertising Value (NZ$160,000 at BioJapan 2007)	Significant
Support to industry bodies	NZTE has influenced the direction of all three industry bodies, helping them become more internationally focused and strategic. NZTE is an observer on the board of all three industry organisations	Significant
Implemented innovative approaches to market and business development programmes	Innovation Challenge, use of webinar and other online technologies, business matching services to firms	Good
Developed international networks	US network through Innovation Challenge, Canada, plus NZTE organised trade shows worldwide	Significant
Addressed some of the capability and infrastructure challenges	NZTE has facilitated the development of pre-clinical trials infrastructure for bioactives and guidelines on clinical trials for medical technologies	Good
Industry collaborations	NZTE has supported industry bodies to develop industry collaborations	Not monitored
New business models		Not monitored
IP registrations		Not monitored
Spin off companies		Not monitored
Commercialisation of new technologies		Not monitored

NZTE's Case Studies

NZTE provided us with case studies to demonstrate the benefits and success stories of various Output Class 2 activities. These have informed the examples included in

Table 13 above. The case studies focus on the following activities within the Health SI:

- Focus on Health – An Innovation Challenge.
- BioJapan and Health Ingredients.
- Medica.
- British Columbia Relationship and Indigenous Health.

The case studies demonstrate that significant private benefits have been generated for firms that have taken part in the trade shows and market development programmes in the US and Canada. The case studies demonstrate that NZTE is very successful at providing business development opportunities for firms.

The case studies, in the main, do not show what wider benefits and spillovers these activities have brought for the sector.

However, NZTE's support of an industry body in the sector shows good evidence of wider benefits to the sector (see Box 2 below). We discuss the role that NZTE can play to develop the sector through industry bodies later in this chapter.

Box 2: NZTE's work with an industry body, under the Health SI, has provided wider benefits to the sector

The Health SI team has been working closely with an industry body in this sector. In the past this industry body has mainly been domestically focused. NZTE has worked with the industry body to increase its international connections, and it has been a participant at BioJapan and Health Ingredients. As a result of this work, an agreement between four New Zealand companies, the industry body and the Hokkaido region in Japan, has just been announced. This agreement focuses on product development and R&D. Additionally, the industry body has just finalised a Memorandum of Understanding with its counterpart in Japan.

Source: NZTE case studies

NZTE is currently reviewing its Strategic Initiatives to provide direction for future activity. The review of the Health SI has so far considered what activities are required to help grow the sector, including considering how clinical trials could benefit New Zealand firms, and the role for advisory boards. The review committee has taken a sector-wide view of possible activities, and we consider these kinds of questions to be appropriate for developing future activities for the Health SI.

Key findings from interviews with firms and industry bodies

Interviews with firms that engaged with NZTE in the Health Strategic Initiative and with industry bodies revealed a number of key findings.

Firms mostly report significant private benefits from NZTE's assistance via the Health SI

Firms mostly reported that they receive significant value from the services provided by NZTE off-shore. Firms were very positive about NZTE's assistance with attending trade shows in off-shore markets. Firms commented on the attention-attracting pavilions and organised events at trade shows; the value of business matching

services; relationships that had developed with potential customers, and in some cases contracts or deals that had been secured. Firms report that the marketing collateral that NZTE brought to these events was greater than they would otherwise have been able to develop themselves. In particular, firms commented on the value of the 'New Zealand government banner' attached to their stand and their profile.

In some cases, firms reported that they would not have been able to attend these trade shows without NZTE assistance. In other cases, firms were sufficiently convinced of the benefits of attending trade shows, and regularly set aside funds in their budgets to do so without the assistance of NZTE.

Firms were also mostly very positive about the business development assistance they had received through off-shore offices, such as market intelligence, support with visa processing, and setting up meetings with potential customers. In some cases, firms indicated that they would not have entered into some overseas markets without the NZTE assistance they had received. Firms again commented on the value that the 'New Zealand government banner' adds to their ability to do business in overseas markets, with the assistance of NZTE. For example, many firms commented that NZTE had enabled them to make contacts, relationships, and get meetings with potential customers that firms had been unable to secure themselves.

Firms indicated a willingness to pay for the business development services that they received in off-shore markets, which demonstrates the value that firms place on these activities. In some cases, firms had provided payment for NZTE's services. Given firms' reported willingness to pay for this business development, NZTE could further consider charging firms for these services that bring direct private benefits to their business.

There are mixed benefits of the 'sector outputs'

While firms were very positive about the private benefits they received from these activities, they were less positive about any wider sector benefits that result from these activities.

Some firms did indicate that they received value from knowledge sharing that occurred at events, such as socialising or seminars attached to trade shows. For other firms, the knowledge sharing and networking with other New Zealand firms was of less value to them. Reasons included that they are focused on their own goals for growth and do not have time to attend events; they have developed sufficient expertise in their niche, and other firms in the sector do not operate in that niche; and they are in direct competition with the firms in the group.

Some firms also questioned the value of NZTE's sector expertise. For example, a number of firms indicated that they operate in particular niches, in which it is difficult for generalist sector staff to add value to. However, this view was not widespread and a number of firms were positive about the sector knowledge that NZTE had been able to share with firms.

There were mixed results on the extent to which collaboration occurs among firms, and the need for government assistance in this area. Our interviews with firms found that collaborations have generally not resulted from NZTE Health SI activities. This is

due to competition within the market, sensitivity around IP rights, or different niche products restricting the potential for collaboration.

However, we did find examples of collaborations occurring, independently of NZTE. Box 3 shows an example of a firm that takes part in a number of different collaborations developed through its own initiative. We found that some firms deny that government intervention is necessary to facilitate these activities, and reported that they are quick to seek out their own collaborations where they see there is the opportunity to do so.

Box 3: Firms seek out collaborations through their own initiative where opportunities present themselves

Company A is one of New Zealand's largest software companies with significant export markets. Company A participates extensively in collaborations with firms where in many cases international collaborations with international firms are required to win tenders on a project. New Zealand firms do not have the capacity to do so. General networking provides the contacts to initiate collaborations. Company A has recently entered the Scandinavian market following an agreement between one of Europe's largest IT service providers and the South Norwegian Health Authority. The project is to implement a desktop programme that will provide a faster easier way to access patient information. In 2009, at the Centre for Disease Control and Prevention's Public Health Information Network PHIN Conference in Atlanta, Company A, in collaboration with another software company, unveiled an integration of their software targeted at identification, tracking and rapid response to diseases outbreaks (eg H1N1 flu).

Box 4 shows an organisation that develops collaborations among firms to seek innovative solutions and research projects in response to healthcare issues.

Box 4: The National Institute of Health Innovation seeks collaborations among firms

The National Institute of Health Innovation (NIHI) works in association with The University of Auckland. The role this organisation plays is to facilitate collaborations between health technology providers, and research expertise to promote innovation. The collaboration of expertise in these projects can be developed and released to the market. NIHI plays a facilitating role in collaboration through identification of health care issues or gaps in the market and seeks firms with the expertise to collaboratively innovate on a project.

We found that NZTE has been instrumental in facilitating collaborations among firms in a small number of cases within the Health SI, through industry bodies. See Box 5.

Box 5: NZTE has supported successful collaborations facilitated through industry bodies

The New Zealand Health IT Cluster facilitated a collaboration lead by a major IT company which sought to integrate a series of healthcare information systems to allow self monitoring by patients at home. The collaboration involved seven firms and support from the New Zealand Health IT Cluster, Auckland DHB, Ministry of Health, FRST, and NZTE. The wider benefits of this project can be seen in both healthcare and innovation. At home technology encourages long term monitoring, and reduces the cost and burden on the hospital system from unplanned admissions and long term health issues. The collaboration between firms has created additional value to existing innovation and knowledge sharing to advance health information systems. NZTE has played a significant role supporting the Cluster over the last 5 years, including providing financial and organisational support, and sitting on the Cluster's board.

A wider benefit that occurs through NZTE's support of health technology and innovation firms is reduced cost to taxpayers through more efficient processes, and improved health outcomes for patients. Box 6 provides an example of a firm that has been supported by NZTE to develop an innovation that has the potential to provide financial savings for hospitals and better healthcare outcomes for patients. However, while supporting health technology firms brings implicit wider benefits, a rationale for NZTE's Health SI should be wider than this.

Box 6: There are wider benefits to supporting health technology firms

Company B is a technology company that has developed software to manage asthma symptoms from the home. The software enables patients to manage their symptoms without the need to present at a hospital in the first instance. NZTE has been working with firms in the Health Sector, including Company B, to help grow the sector by involving them in competitions to help them gain access to support and advice that will grow their business. The wider benefits of NZTE supporting firms like Company B are improvements in patient healthcare, and savings to the public system through reduced hospital admissions. The Ministry of Health are working with Company B to quantify the savings that their technology is able to provide for hospitals.

There is overlap between the activities of industry bodies and NZTE

Our interviews with firms and industry organisations in the health sector identified that there is overlap and duplication between the activities of industry bodies and NZTE. For example, industry bodies informed us that they organise conferences, provide seminars and networking events for firms, provide market intelligence to firms on particular overseas markets, organise representation at trade shows, and facilitate collaborations to innovate among firms both in New Zealand and overseas. Box 7 outlines the role of an industry body in the sector and the role NZTE has played in supporting them.

Box 7: NZTE's role in developing an industry body in the sector

NZTE provided initial funding for the creation of an industry body representing medical device manufacturers and distributors and emerging technologies; and subsequent funding for specific sector activities or projects. This industry body provides to its members industry training, seminars and conferences with international speakers, market trend information and assistance to attend international trade fairs. Through the events organised by the industry body and NZTE, firms are able to collaborate and network.

NZTE has played a significant role in developing some of these industry organisations, both financially and through providing support for organisational and sector leadership. In our view, this is an appropriate and useful way of NZTE facilitating sector activity. We consider NZTE's support and development of the health sector industry bodies to be a significant success for NZTE's Health SI over the last three years.

NZTE could more usefully benefit the sector through its sector activities by widening their scope beyond simply High Growth Potential firms. We found that industry bodies are more likely to focus their activities on all firms within the sector, regardless of their size. In comparison, NZTE focuses its sector activities on those firms engaged through its other Output Classes. These firms are High Growth Potential firms. There are many firms operating within the health sector that are not included

in this High Growth group, yet have the potential to develop innovation and technology that can benefit the sector.

Given the successful work that NZTE has done to develop industry bodies in the health sector, NZTE should now consider whether its own efforts are necessary given the existing capability within industry to organise and undertake similar activities to those organised by NZTE. It may be appropriate for NZTE to continue to play a leadership role and help to facilitate industry organisations to undertake the sector activities that they do, for example through continuing to contract industry organisations to deliver specific events and deliverables.

NZTE could improve its efficiency and effectiveness through targeting funding on sector outputs

NZTE informed us that 159 firms took part in the Health Strategic Initiative in 2008/09. NZTE does not have information for previous years. We have not been provided with information on the extent to which these firms have engaged in the different activities within the Health SI as it is not readily available on an annual basis. Expenditure for the Health SI for 2008/09 amounted to $1.691 million. This equates to a cost of $10,635 for each firm recorded as engaged in the Health SI. NZTE's information on the private benefits delivered to firms, for example at trade shows, shows that the benefits of this expenditure significantly outweigh the cost per firm of NZTE's support through Output Class 2.

However, it is appropriate that NZTE provide business development services to firms through its commitments in other Output Classes. We note that most of the firms engaged through Output Class 2 have received other NZTE services or grants from other Output Classes. The attributability of the private benefits to firms to Output Class 2 expenditure is therefore not clear. We would expect that Output Class 2 expenditure should be focused on activities that provide wider benefits to the sector, not individual firm level benefits. We would expect such benefits to be the focus of NZTE's activities in other Output Classes.

An analysis of activities for the Health SI shows a high proportion of activities focused on trade shows and in-market business development. We consider that Output Class 2 expenditure should be targeted at activities that provide wider spillover benefits to the sector.

NZTE could provide better value for money for Output Class 2 expenditure by considering whether direct costs on activities are necessary, and most likely, to deliver sector wide benefits. For example, NZTE's business cases indicate that a significant proportion of expenditure on Health SI activities are spent on designing and building branded pavilions, and associated marketing activities, at trade shows. An alternative expenditure would be to make the best use of NZTE staff time and skills by spending time meeting with firms to persuade, and support, firms to attend themselves[46]. If firms are likely to receive growth benefits from attending trade

[46] We acknowledge that NZTE do undertake such activities. Under OC2 we would expect to see more of this type of activity.

shows, it is difficult to see why government assistance is required from Output Class 2 expenditure.

Our interviews with firms found that firms are prepared to pay themselves to attend trade shows where it is in their interest to do so. While firms comment that NZTE's marketing collateral goes beyond what firms could do themselves, it is not clear why this expenditure is appropriate from Output Class 2, rather than NZTE's other Output Classes that focus on international market development for firms, or what the wider benefits to the sector are. Our interviews with industry bodies also found that industry bodies support firms to attend international trade shows.

NZTE could significantly improve the value for money of its expenditure on Output Class 2 activities, by directing resources to those activities that are more likely to bring about wider sector benefits.

Impact of Trade Shows

Findings from this evaluation confirm a general consensus that tradeshows provide individual level benefits to firms, and that supporting firms' attendance at tradeshows can positively affect firm level productivity[47]. This is the underlying rationale of NZTE's other output classes that focus on providing support to firms to internationalise, including to attend tradeshows.

Output Class 2 activities are intended to generate spillover benefits to the wider sector. NZTE consider that tradeshows give rise to the following sector benefits:

- *Raising the reputation of New Zealand sectors of firms more generally*
- *Building the capability of sectors, for example through webinars and workshops (both in NZ and in market*
- *Networks are effectively and efficiently built up at tradeshows as many of the key influencers and stakeholders are present. NZTE consider that these networks benefit all companies and New Zealand*

From our interviews with firms and stakeholders, we have not been able to find evidence of significant and demonstrable sector benefits arising from tradeshows. NZTE have also not been able to provide us with case studies that demonstrate wider sector benefits from these activities. Other research and evaluation concurs with this finding, concluding that while there may be wider spillover effects from these types of activities, the effect is difficult to verify or quantify.

We conclude that activities that are intended to deliver wider benefits to sectors would be better designed around those types of activities outlined in this report that are more likely to lead to demonstrable sector outputs.

Conclusion

NZTE's objectives for the Health SI focus on helping firms to discover market opportunities, making global connections, raising industry capability and overcoming barriers of doing business for firms. A number of different sources anticipate potential growth for the health innovation and technology sector.

[47] Also see Evaluation of UK Trade & Investment's Tradeshow Access Programme Final Report to UK Trade & Investment prepared by London Economics, September 2008.

However, it is difficult to identify specific market failure spillover rationales underpinning many of NZTE's activities for the Health SI. Many of the activities appear to be similar to the types of market development activities provided to firms in NZTE's other output classes.

Feedback from industry confirms the value of NZTE activities and case studies showed that there were significant private benefits to firms from participating in activities delivered under the Health SI. NZTE has been successful at providing business development opportunities for firms in this sector. The case studies, however, did not show evidence of wider benefits and spillovers arising from these activities for the sector.

Similarly, interviews with firms suggested significant private benefits to firms from NZTE's assistance through the Health SI. Firms, however, were not able to confirm that they had passed on wider sector benefits to the sector. There are some exceptions to this finding, and we found some good examples of NZTE delivering some valuable sector outputs in the Health SI. NZTE should improve the value for the money for investment in the Health SI by directing resources to those activities that are more likely to bring about wider sector benefits.

7. Findings: Primary Sector Strategic Initiative

This chapter reports and discusses findings on the Primary Sector Strategic Initiative.

7.1 Objectives of the Primary Sector Strategic Initiative

NZTE's Statement of Intent 2007-2010 identified the primary sector as a focus for one of its Strategic Initiatives. NZTE's aim was to accelerate the growth of globally successful businesses from the primary sector, by shifting the focus from exporting to engaging internationally, using a range of business models. The SI aimed to:

- Encourage new products and technologies to be developed, using new and better production methods, focusing on productive efficiency, international opportunity, outward investment, and market-driven research and development.
- Develop and promote innovative international business models, including encouraging companies to use collaborative and niche business models.
- Increase the awareness of the quality, safety and integrity of New Zealand primary sector products, and increase demand for food products.

In 2009, NZTE reviewed its strategic initiatives and modified the focus of the Primary Sector Strategic Initiative. However, the main goals of the SI remain similar to those stated earlier in 2007:

- Improve industry performance to exploit high value markets.
- Develop innovative technologies to support the primary sector.
- Build scale and presence in key markets.

The initiative is a cross-sector initiative involving the biotechnology/agritechnology, ICT, wood and food and beverage sectors. From 2009, work from previous SIs on the wool industry has been incorporated into the primary sector SI.

To date, $5.93 million has been approved for expenditure on the Primary Sector SI, as shown in Table 14.

Table 14: Expenditure approved for the Primary Sector SI

Total Funding: 2005/06/07	2007/08	2008/09	2009/10	Total
$2.942 million	**$2.27 million**	**≈$1.99 million**	**≈$1.67 million**	**≈$5.93 million**

Source: NZTE board paper 2007

7.2 Background

Why this sector and how it was chosen

NZTE informed us that a flexible approach, based on a number of internal factors within NZTE, determined the choice of the primary sector for a Strategic Initiative.

First, many of the original initiatives and projects within NZTE were directed by previous government goals, especially primary sector projects. NZTE were alerted to a lack of support in these areas, including for Food and Beverage, and Fisheries sectors. Second, NZTE informed us that they were aware at the time that nothing was being offered to New Zealand's larger firms. Third, the SIs intended to create more cohesion and rationalisation among many existing sector projects in NZTE (around 300 at the time). We were informed that the SI model sought to address these difficulties.

NZTE's internal guidelines for developing an SI were to encourage or create collaboration across an industry. The primary sector was considered a good candidate for an SI, in part, due to internal difficulties within the meat industry and also because of New Zealand's comparative and competitive advantages. The SI sought to create more collaboration among these firms.

7.3 Analysis

Intervention rationale: the Primary Sector SI focuses on barriers for firms rather than pure market failures

NZTE's 2007 board paper outlines that the projects under the Primary Sector SI address one of three or more fundamental areas of market failure:

- Lack of ability and resources within individual companies to commercialise and apply new technologies across the industry to achieve competitive advantage (Commercialisation/Capability).

- Difficulty in addressing market access issues and tapping into networks to create effective market development partnerships. This leads to some reluctance by companies to enter new markets, and may lead to a perception by in-market partners and customers that New Zealand companies lack confidence and credibility (Access/Networks).

- Lack of resources within individual companies to truly internationalise – to "jump the divide" between total reliance on third party partners in key markets and development of a direct presence or other more sophisticated business models (Internationalisation).

Barriers or difficulties for firms in entering markets do not necessarily constitute a market failure, or a reason for government to intervene. We have not seen evidence that demonstrates that these market failures exist among the primary sector firms

targeted by the Primary Sector SI. Later in this chapter, we discuss our findings from interviews with firms on the extent to which these barriers exist.

Government considers the primary sector an important industry for New Zealand

Cabinet had also indicated a requirement to focus on Pastoral Systems and Food and Derivatives in its 2007 agreement[48] on 'Areas of Focus to Support Economic Transformation'. The Cabinet Paper outlined proposals for a joint targeted approach to these areas by the relevant government agencies, including the Ministry of Economic Development, the Tertiary Education Commission, the Foundation for Research Science and Technology, and NZTE.

The pastoral sector is considered a predominant industry for New Zealand's economy. In 2006, the pastoral sector earned gross revenue of NZ$17 billion and contributed NZ$7.7 billion to our GDP. In 2006, there were 45,000 active businesses, providing NZ$2 billion of wages (excluding ownership earnings). New Zealand has several global-scale businesses in the pastoral sector, including Fonterra and PGG Wrightsons.

The paper considers that there are opportunities for New Zealand in the pastoral sector, including:

- Becoming the world leader in technologies that are of value to pastoral agriculture worldwide.
- Investigating water quality management and efficient water use technology.
- Selling and licensing the knowledge behind the physical products and technology, in addition to the products themselves.

The paper notes that New Zealand has world leading centres of research excellence around pastoral systems, including:

- The Waikato Innovation Centre
- AgResearch which is focusing on creating more profitable and sustainable farm systems and value chains
- The cluster of activity around Massey University in Palmerston North and Lincoln University in Canterbury
- The Pastoral Greenhouse Gas Research Consortium
- The Agricultural Research Group on Sustainability.

The Cabinet paper also notes a role for government in investing in funds to help fund research and help realise the spillover benefits of research across the industry. The paper comments that research in this area needs to be well supported with commercialisation opportunities that have a global market perspective. Shortages in

[48] POL (07) 337.

skilled labour act as a growth impediment, and the paper suggests there is an additional role for government beyond current education and science funding.

Across the food and derivatives opportunity, international collaboration is identified as a key role so that supply chain efficiencies can be integrated into the positioning of materials and products.

Projects under the primary sector SI could better focus on 'sector outputs'

The Primary Sector Strategic Initiative has consisted of a number of activities to achieve its main objectives. Table 15 shows the full list of activities for the SI stated in NZTE's board papers since 2007/08.

Table 15: NZTE activities for the Primary Sector SI

Name of NZTE activity	Description	Type of activity
Functional Foods	Integration of technology based animal and farm management systems to improve productivity and profitability in beef and sheep and deer farming	Commercialisation of technology
Shanghai Wood Innovation Centre	Develop showcase for NZ wood products targeting the construction and furniture industries in China with high value processed pine products	Market focused activity
China Retail Channel Development	Coordinated entry to the Chinese retail sector via strategic partnerships with retailers and logistics providers	Market focused activity
Farmgate 2 (Sheep/Beef/Deer)	Use of enabling technologies to increase productive output in the agricultural sector	Commercialisation of technology
Shangri-La Leveraging	Develop the market for New Zealand products in the South East Asian hotel and restaurant industry (HRI) via a strategic relationship with the Shangri-La Hotel chain and their distribution partners	Market focused activity
South America Food Value Chain	Facilitates partnership in South America to complement NZ's primary sector production and gain access to difficult third markets via South American trade agreements	Market focused activity
North America Channel Development	Expand the business of companies already supplying into North American retail market and food services markets through strategic partnerships, collaborative distribution and market operations	Market focused activity
China HRI Channel Development	Build efficient supply chains in the China food service channel. Replaces Shangri-La Leveraging and China Retail Channel Development	Market focused activity
Herringbone Dairy Systems	Testing and integration of milking shed technologies to achieve productivity improvements in herringbone style milking sheds. Replace rotary milking shed technology	Commercialisation of technology
North American	Participation at World Dairy Expo, Mission to	Tradeshow and market

Name of NZTE activity	Description	Type of activity
Pasture Initiative	Eastern US Dairy states to investigate potential for joint marketing, distribution	focused activity
Pastoral Farming Systems	Expansion of NZ agriculture technology and training for firms into South America	Market focused activity
Sensor Networks	Quantify primary sector market niches for sensor technology; contributes towards demonstration of sensor technology's effectiveness and commercial feasibility	Commercialisation of technology
UHF Animal Identification	Trial effectiveness of ultra high frequency of radio identification applications	Commercialisation of technology
Wool Industry Development	Build performance of New Zealand's wool industry through industry capability development. Investigate opportunities for merino meat.	Support to industry

Projects under the Primary Sector SI fall into three main categories, with the majority of the activities falling under the market focused activity category. Table 16 shows a breakdown of the number of activities that fall within each category.

Table 16: Types of activity within the Primary Sector SI

Type of activity	Number of this activity under the Primary Sector SI
Commercialisation of technology	5
Market focused events or activities to develop business and relationships for firms in countries of interest (such as North America, South America, China)	8
Trade show	(included as part of a market focused activity in North America)
Total	**14**

Activities focused on commercialising technology, for example to improve productivity in the sector, provide greater potential for wider benefits to the sector. NZTE's Primary Sector SI could benefit from increasing its activities that provide the potential for greater wider benefits. There is currently a disproportionate emphasis on market focused activities in the SI.

However, there is the potential for duplication between different agencies that provide technology assistance to firms. NZTE staff informed us that many of the activities within the primary sector SI are focused on research and innovation, and on 'proof of concept in technology'. Given the roles of FRST, TEC and MORST, there is the potential for duplication in this area across agencies. Our interviews with NZTE staff and stakeholders identified that there is some uncertainty around the extent to which activities between these agencies and NZTE's primary sector SI are aligned. As outlined above, there are a number of existing organisations that focus on developing both technology and collaborations among firms, including:

- The Foundation for Research, Science, and Technology

- The Waikato Innovation Centre
- AgResearch (focusing on creating more profitable and sustainable farm systems and value chains)
- The cluster of activity around Massey University in Palmerston North and Lincoln University in Canterbury
- The Pastoral Greenhouse Gas Research Consortium
- The Agricultural Research Group on Sustainability
- Industry bodies.

The distinction between NZTE's activities and interventions, and the necessity for these over and above the existing activities of other organisations, is unclear to a number of stakeholders that we interviewed.

NZTE staff informed us that firms receive cultural and market intelligence on the international markets targeted by the SI's activities, and that NZTE provides cultural information on these markets that goes beyond the intelligence provided by usual market intelligence agencies. It is possible that NZTE could be crowding out the market for private sector provision of these activities, and firms could legitimately be expected to pay for these services. NZTE's other output classes contain funding to assist firms in international markets, including to receive market and cultural intelligence. It is not obvious why funds for Output Class 2 are also required for this purpose.

NZTE staff informed us that firms cost-share in some circumstances, including paying for their own travel costs to attend trade fairs. Activity plans are available that outline the private sector contributions to activities expected by NZTE. The justification however for government to pay for provision of these services to these firms, through Output Class 2, is not clear.

It is difficult to identify how these activities differ from the intended services offered to firms from other NZTE Output Classes[49]. As outlined previously, Output Class 2 activities are designed to provide projects that encourage wider benefits and spillovers to the economy, beyond direct benefits to firms involved. It is difficult to identify why activities that focus on private business development for firms should form the majority of activities within the Primary Sector SI.

Objectives for the Primary Sector SI state that collaborations across the sector are one of the main focuses of these types of activities. We have been provided with limited evidence to show that NZTE has identified that collaborations have occurred. We discuss this further below.

As we note for the Health SI, NZTE could provide better value for money for Output Class 2 expenditure by focusing more of its activities and resources on outputs that are better designed to provide wider benefits to the sector. Support to industry

[49] Output Class 3: Analysis and Development Services for Firms and Output Class 4: Identification and Coordination of International Market Opportunities.

bodies or sector organisations are good examples of this, and later in this chapter we provide further examples of good 'sector outputs'.

Also later in this chapter we discuss firms' views on the impact of these activities.

We were pleased to see in NZTE's 2007 board paper an analysis of the spillovers expected from the Primary Sector SI, shown in Table 17. These spillovers include collaborations among firms, exemplar companies to act as role models, transfer of technology and best practice with the industry, and spillovers to other sectors. We would expect to see some analysis, or information gathering, within NZTE on the extent to which these types of spillovers have occurred for all of the SI's activities. We were pleased to find in our interviews with NZTE staff an openness to acknowledge that there has been a lack of focus to date on activities that are most likely to generate spillovers, and that this is a current area of weakness in the Primary Sector SI that could be improved.

Table 17: NZTE's 2007 outline of the spillovers expected from the Primary Sector SI

Workstream	Spillover
China Retail Channel Development	Creating of exemplar companies to provide role models for NZ companies looking to enter "difficult" markets
	Validation of the "store within a store" concept as a platform for marketing New Zealand products in a retail environment
	Increased NZ brand awareness among Chinese consumers (leverages off work currently underway by Air New Zealand and Tourism NZ), supported by the development of influencer networks
Farmgate 2	Technology, knowledge and best practice transfer within the agritech industry
	New Zealand recognised globally as an originator of innovative and effective agricultural technologies
North America Channel Development	Creation of exemplar companies with respect to internationalisation and engagement in global value chains
	Enhancement of the New Zealand brand among high discretionary income US, Canadian and Mexican consumers
Shanghai Wood Innovation Centre	Development of a cohesive group of wood processing companies demonstrating the benefits of collaborative work
	Positioning of New Zealand as a world-class supplier of value-added wood products to Chinese manufacturers
	Demonstrated success of New Zealand companies working together in a market to showcase New Zealand products and innovation
Shangri-La Leveraging	Shift in NZ companies' perception of the importance of developing and maintaining strategic business partnerships
	Increased awareness of the New Zealand brand in South East Asian markets

Workstream	Spillover
	Opportunity to leverage strategic relationship with Shangri-La SEA into other regions
South America Food Value Chain	Spillover into other sectors (eg Education) as complementary programmes are developed.
	Change in business mindset towards use of new and innovative business models as a tool for internationalisation
	Raised awareness in South America of business capability of NZ companies
Functional Foods	Validation of a model for commercialisation of innovation, involving collaboration between companies, multiple government agencies, research providers and industry experts
	Creation of exemplar companies who have demonstrated that it is possible to create commercial value from functional foods
	Positioning of NZ food and research companies as globally competitive in development of scientifically validated functional foods

Source: NZTE board paper 2007

The impact of the Primary Sector SI has been difficult to demonstrate

NZTE outlined the outcomes and results that it expected from the Primary Sector in its Statement of Intent 2007–2010, shown in Table 18. These outcomes include increased use of new technologies, increased numbers of New Zealand businesses operating internationally, and increased business for food companies.

Table 18: NZTE's expected outcomes from the Primary Sector SI

Strategic Initiative	Outcome area	Expected Three-year result
Creating Value from the Primary Sector	Increased use of new technologies to support the commercial activities of New Zealand food companies in international markets	Increased numbers of farms adopt on-farm efficiency technology modules
	Increased number of New Zealand businesses using consolidated channels	Increased number of New Zealand based companies operating in North Asia and North America
	Increased consumer awareness and increased acceptance of New Zealand products	Generate increased business from increased market penetration by New Zealand food companies

Source: NZTE Statement of Intent 2007-2010

NZTE further outlined in its 2007 board paper for the Primary Sector SI that it anticipated:

- increasing the number of primary sector firms exceeding $50 m in sales

- graduating firms from the Primary SI into Better By Design and Beechheads
- using its networks to assist companies to undertake activities that would be beyond their reach individually by encouraging collaboration among New Zealand firms.

NZTE informed us that they are not yet able to fully measure whether these outcomes have been achieved. NZTE has provided some examples, outlined in case studies below, of progress towards achieving these outcomes for the Primary Sector SI.

NZTE's performance measures have focused on outputs, rather than giving an indication of progress towards achieving objectives and outcomes. NZTE staff told us that this is partly due to the difficulty of assessing the achievement of technology development projects. Fifty eight percent of NZTE's performance targets for the Primary Sector SI were met in 2007/08 and 50 percent of targets were met in the 2008/09 financial year. As we note for the Health SI, NZTE's performance measures should be designed to give a better indication of progress towards achieving objectives and outcomes.

NZTE provided us with information on the impact of the Primary Sector SI (see below). The achievements include benefits to firms taking part in the SI. These benefits do not show evidence of wider benefits to the sector, including those items outlined above as the expected outcomes for the SI: namely, collaborations among firms and increased use of new technologies. NZTE have not formally measured firm satisfaction for the Primary Sector SI, but told us that they have received good anecdotal feedback from firms.

Impact of the Primary Sector Strategic Initiative:

- *Farmgate II demonstrated increased profitability of $200 per hectare on North Island demonstration farm. Long term economic impact is dependent upon commercial uptake of technology (to be monitored over 2-3 year period).*
- *China Retail Channel Development: Substantial lessons learned for NZTE and 40 companies regarding critical success factors for food and beverage companies entering China (document now available as a resource for distribution to firms); increased profile for NZ brand (equivalent advertising value approx NZ$100K); 41 companies assisted to enter China market for first time; 3 companies signed commercial representation agreements, a further 11 companies commenced commercial negotiations as a result of NZTE introductions to project partners*
- *Asia HRI: Key lessons learned re: critical success factors for accessing hotel supply chains, and for NZTE in terms of project structure. Little to no commercial outcomes achieved, project focus moved from South East Asia to China, and final year spend scoping future activity in China*

NAM Channel Development: 3 companies have invested in in-market representation, which has generated nearly NZ$1 million in additional revenue in the first 12 months; A number of companies have achieved national listings with Whole Foods as a result of NZTE introductions

Source: NZTE collated factsheet

NZTE anticipate a net economic benefit generated from the Primary Sector SI of $180m per year. This is based on estimates using the method outlined earlier in the report. In addition to the matters noted there, NZTE have not assessed whether

these estimates have occurred, so we cannot attribute significant impact to the SI on this basis.

NZTE advise us that 74 firms have been engaged through the Primary Sector SI for the 2008/09 year. Information is not available for previous years.

NZTE has provided us with case studies to demonstrate the benefits and success stories of the Primary Sector SI. In some instances, the case studies demonstrate intentions to facilitate projects that do bring wider benefits to the sectors targeted. For example, a case study of the Food Value Chain Project outlines the objectives to bring about collaborations among firms and new business models. The NAM Dairy Initiatives project initiated collaborations among firms (which later fell through), and demonstrates successful development of the sector through the industry body. The North American Channel development project also notes an objective to facilitate collaborations among firms. The Farmgate II project demonstrated the potential for improved productivity to the sector through better technology, and findings were disseminated across the sector.

We consider that NZTE could strengthen and improve its achievement of these sector benefits. While many of the case studies show intentions to achieve sector outcomes, they do not show that significant benefits have yet materialised to the sector. For example, the case studies do not show that the intended collaborations have indeed led to a number of collaborative business models among New Zealand companies. Partnerships with overseas companies do not clearly bring benefits to the New Zealand sector. NZTE should also consider what sector benefits are expected from developing stands and pavilions at trade shows, and supporting firms to attend.

Moreover, there are existing organisations in the Primary Sector, such as those outlined above, that also work to facilitate collaborative technology demonstration projects. The rationale for NZTE to be undertaking this work in addition to these organisations, or what problem requires government intervention, is not clear.

NZTE should ensure that findings from across its projects, that may not have been successful, are disseminated across the sector beyond those firms engaged with NZTE.

We have sought specific information from individual firms that have engaged in the Primary Sector SI in order to ascertain what wider benefits and spillovers these activities have brought for the sector.

Key findings from interviews with firms and industry bodies

Firms report significant private benefits from NZTE's assistance via the Primary Sector SI

Similar to our interviews with firms engaged in the Health SI, our interviews with firms that engaged with NZTE in the Primary Sector SI mostly reported that they receive significant value from the services provided by NZTE off-shore. Firms were very positive about NZTE's assistance with attending trade shows, and providing business development services in off-shore markets. Firms commented on the value of business matching services; relationships that had been developed with potential

customers, and in some cases contracts or deals that had been secured. In particular, firms commented on the value of the 'New Zealand government banner' attached to their business that NZTE representation can bring. Firms also commented on the psychological value of off-shore offices, providing a familiar contact in a risky foreign market, and assisting with logistical, immigration and language issues.

In some cases however, Primary Sector firms' satisfaction with market intelligence and business leads provided off-shore was variable depending on the particular market and particular office. Some firms expressed a preference to engage private sector experts for market intelligence and sector expertise.

Without NZTE assistance off-shore, firms commented that they would have found entering a new market more difficult, may have taken them longer, and they may have attended less trade shows. However, in a small number of cases firms were sufficiently convinced of the benefits of attending trade shows and paying for private sector off-shore services themselves, and set aside funds in their budgets to do so without NZTE assistance.

Firms were very positive about co-funding grants from other Output Classes that allowed them to spend matched resources on direct business needs. They considered that these grants allowed a clear audit trail, prevented "cheating", and were more beneficial to business' need than off-shore 'soft support'.

There were mixed benefits of the 'sector outputs' of Primary Sector activities

Firms were more positive about the private benefits that Output Class 2 activities had brought to their businesses than the wider sector benefits. NZTE's intention for Output Class 2 activities has been to bring groups of firms together in group activities, contrasting to NZTE's activities in other Output Classes that focus on in-market assistance directly on behalf of the client.

Our interviews found that activities to bring together firms in groups had mostly not led to collaborations occurring between firms. Firms acknowledged that NZTE had brought New Zealand firms together in the initial stages, and this led to exchange of contacts that firms would later follow up themselves, for example to share information on logistics. But these activities had in general not led to shared business models.

There were a number of reasons for a lack of collaborations resulting from the Primary Sector SI activities. Firstly, in the case of one particular activity, firms were in direct competition for customers with each other. For example, a more established firm experienced that their established customers and leads were shared with other younger competing firms. Second, there was a view that collaborations are a theoretical model that is not easily applied when firms operate in different niches. Firms also considered that they are able to pursue opportunities themselves for collaborations where direct benefits are evident. Third, a conflicting view was that firms do not currently collaborate sufficiently and NZTE is needed to play a leadership role to encourage firms to collaborate where opportunities for new business models existed.

We found an exception to this finding where a new business model had emerged for an established firm that had been assisted by NZTE to enter a new market. The firm

adapted their business model to incorporate distribution elements, and now works with other New Zealand firms in a distributive capacity in the South American market (see Box 8).

Box 8: Company C has changed its business model in the South American market

Company C is an established firm that has entered the South American market with assistance from NZTE under the South American Food Value Chain and Pastoral Farming Systems. The company's main focus has been to set up operations in Chile, making significant investments in staff and warehousing. Entry to this market has seen Company C create a new business model by becoming their own distributor. Their operations have extended as they have become agents for other New Zealand firms in that market, creating wider benefits to the sector

We have also found examples of NZTE facilitating collaborations among firms. Box 9 shows an example of NZTE helping three firms to collaborate over their entry into the North American market.

Box 9: Three NZ food companies have collaborated to access the United States

Three New Zealand food companies have worked in collaboration to gain access to a large US distribution network. The three companies spent more than a year developing a deal with a major US retailer which has 270 stores in the US and Canada. The deal was brokered with the assistance of NZTE, who suggested the project to eight different New Zealand companies. NZTE have financially supported the deal in the initial stages, but will exit after 12 months. The firms will continue the arrangement in a number of different regions of the US

Role of industry bodies

We found that industry bodies in this area are performing similar roles to those performed by NZTE, including organising on-shore networking events, and organising group representations of New Zealand firms at trade shows. However, firms commented that NZTE has access to larger resource than industry bodies, and this was of benefit at generating marketing collateral at international trade shows. In one case, NZTE had supported an industry body to facilitate collaborations among firms, shown in Box 10.

Box 10: NZTE has supported collaboration

A major NZ seafood company that collaborates with other firms within the seafood sector identifies the benefit of networking and sharing knowledge. These collaborations are facilitated by NZTE and Aquaculture New Zealand (AQNZ), an industry body that represents New Zealand Mussel, Salmon and Oysters industries. The firm considers that while collaboration between industry participants within the sector is very valuable, coordination is difficult given the competition and lack of capacity within the sector to facilitate collaborations

We found that NZTE had been successful at leading industry bodies in the primary sector to develop their organisations and their strategies. In some cases, NZTE had also provided financial assistance to industry bodies and had contracted them to deliver specific events and deliverables. We consider NZTE's work to develop industry bodies in this area to be a wider benefit to the sector, and a significant achievement that has arisen from its Output Class 2 activities. NZTE should consider increasing its range of this type of sector activity, as the benefits of these

activities accrue across the sector beyond High Growth Potential firms that tend to be targeted by NZTE's own Output Class 2 activities.

Conclusion

NZTE's main objective for the Primary Sector SI is to accelerate the growth of globally successful businesses from the primary sector, by shifting the focus from exporting to engaging internationally, using a range of business models. More specifically, the goals are to improve industry performance to exploit high value markets; develop innovative technologies to support the primary sector; and build scale and presence in key markets.

NZTE's early intervention rationales for the SI show a good awareness of the types of spillover benefits expected for sector activities. NZTE activities for the Primary SI are partially aligned with these rationales, however some of the activities appear to be similar to the types of market development activities provided to firms in other output classes.

NZTE case studies on the benefits and success stories of the Primary Sector SI showed that in some instances projects were being facilitated that intended to bring wider benefits to the sectors targeted. NZTE could, however, strengthen and improve its achievement of these sector benefits. While many of the case studies show intentions to achieve sector outcomes, they do not show that significant benefits have been realised. For example, the case studies do not show that the intended collaborations have resulted in a number of collaborative business models among New Zealand companies.

As noted previously for the Health SI, NZTE could provide better value for money for Output Class 2 expenditure by focusing more of its activities and resources on outputs that are able to provide wider benefits to the sector.

8. Findings: Sector Projects

This chapter presents findings on five sector projects undertaken as part of OC2 activities:

- Biotechnology
- Aviation industry activities
- Connect NZ
- International Supply Chain Integration
- Marine industry activities

8.1 Biotechnology

Background

Over the years NZTE have engaged with the biotechnology sector through a number of activities. Initially the Growth and Innovation Framework (GIF) and the Biotechnology Taskforce Report (2003), presented a strategy for growing the biotech sector, which gained strong ministerial support, this formed the basis for assistance.

NZTE support to the biotech industry has focused on financial and advisory assistance to establish a successful unified industry association, and project specific activities. The former includes a $400 K grant to NZBIO, administered by NZTE on behalf of MED and other support to gradually build up that organisation's and sector's profile and capabilities. The latter consists of helping develop and promote New Zealand biotech research, applications and capabilities, both internationally and domestically, either by directly coordinating New Zealand representations to trade events or by working with NZBIO on such activities.

Funding

The annual funding for biotech support activities has been approximately $1.3-1.85m per annum since 2006/07. Of this $1m was support for NZ Bio. The remainder has supported a diverse range of sector related activities.

Objectives

Support for the biotech sector dates back to the GIF task force report (2003). That report proposed an overall strategy for growing the biotech sector. NZTE's objectives for contributing to this overall objective were:

- to assist in the establishment of an industry body (ie NZBIO)[50]
- essentially by providing short term funding, starting in 2003/04 and initially for a period of three years

[50] Review of the GIF Industry Governed Bodies Fund and the GIF Sector Project Fund, MED, 2006.

- to mentor NZBIO to take over increased responsibilities from NZTE[51]
- to improve the international perception of New Zealand as a source of world-leading biotechnologies[52], or more specifically:
- to increase knowledge of New Zealand capabilities
- to increase international demand for NZ biotechnology offerings
- to develop strategic international relationships
- to enhance trans-Tasman collaboration with the Australian biotech industry
- to improve understanding of offshore market needs, and generally
- to deliver net economic benefit.

In summary, NZTE's approach to assisting the biotech industry has comprised:

i. helping to establish a successful industry association;
ii. firm capability building;
iii. strategic market entry and development; and
iv. helping the New Zealand biotech sector establish an international profile.

NZTE have particularly emphasised the importance of international profiling and their substantial work in helping establish a presence at international fora and hosting international conferences. This has included helping build the New Zealand presence at the BIO International Convention, held annually in USA, with participants from throughout the world.

Intervention rationale

NZTE interventions in support of the emergence of a successful biotech sector are, essentially, based on coordination and information failures. There is some evidence to suggest that the biotech sector may be affected by these types of problems.

Both the private sector and the government have made substantial investment in biotechnology research and development in New Zealand. Statistics New Zealand estimate that this investment was about $169m in 2005 and $250m in 2007. Regrettably, many of the larger enterprises taking part in this work have not succeeded and several large firms have closed. They include Protemix, Neuren, Virionyx, Proacta and Genesis R&D. Both FRST and NZTE have supported these firms.

Although the number of biotech firms grew by about 50 percent between 2005 and 2007, the industry is still small and dispersed. Moreover, it is characterised by a high number of relatively small firms. In 2007 there were 168 firms active in biotechnology, 69 of which had less than 10 employees. The number of firms with

[51] NZTE board paper on AusBiotech 2008, June 2008.

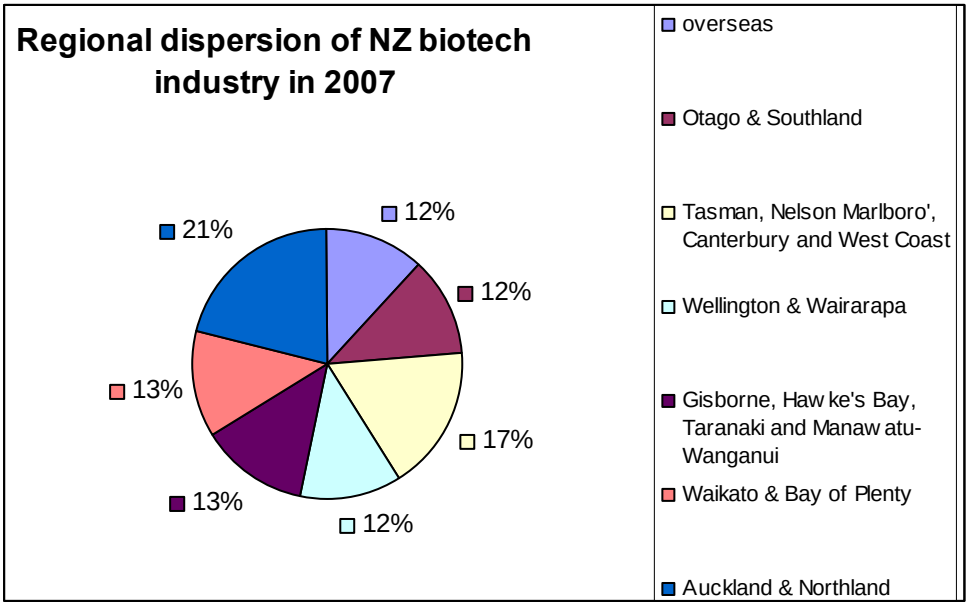
[52] NZTE board paper, September 2007.

more than 50 employees had declined from 72 in 2005 and 2006 to 57 in 2007[53]. The increase in the overall number of biotech firms was therefore due to an increase in the number of relatively small firms.

In addition, the biotech industry is not concentrated in one or two locations but spread widely across the country (see Figure 5 below).

This dispersion across the country and the high number of relatively small firms can make it more difficult for the industry to achieve agglomeration benefits. Likewise, many firms could be too small and might therefore lack the resources to individually undertake certain tasks, such as multidisciplinary networking, which might be relevant to them.

Figure 5



Source: NZBIO

Establishing and maintaining international connectedness could be instrumental to its future success. According to NZTE however, acquiring relevant knowledge about international developments, business opportunities and trade events would be too costly an undertaking for many firms, and especially for those that are new. But these things may be particularly important for New Zealand based firms as, given their relatively small size and the size of the New Zealand market, overseas players could also easily overlook their capabilities.

Imperfect or limited information and coordination issues are a feature of any economy or industry. Business acumen is often based on being able to make better use than one's competitors of the incomplete information that is available. Government agents are not able to address every information or coordination issue, given the limited resources available.

[53] NZBIO figures. However, the recently published Statistics NZ Bioscience Survey 2009 indicates that the numbers of larger firms may have returned to 2005 levels.

In order to justify government intervention in the biotech area further reasons are required. NZTE consider these would include the micro-size of most New Zealand biotech companies in the start up phase and the length of the commercialisation phase, which can be eight to ten years. This often means that accessing capital for commercialisation is more difficult because of the higher risk in valuing technologies given longer time horizons.

Unfortunately, NZTE papers provide limited insight into what these further reasons might be. Underlying documents and board papers infrequently refer to spillovers when talking about the need for NZTE involvement.

NZTE's major activities in the biotechnology area were developed as part of the then Government's biotechnology strategy actions which included a strong focus on global participation.

Coordinating New Zealand participation in international forum on biotechnology is said to benefit not only those firms that participated in such activity but also spillovers to other firms in the industry. Concrete evidence of this occurring has not yet emerged.

The potential for positive externalities or spill-overs would indeed be a market failure to support government intervention. Their existence would mean that government intervention could improve on the market outcome.

A stronger spill-over argument for government intervention to target the biotech industry was made by the original GIF report. Biotech was seen as an enabling technology which could potentially benefit other important sectors of the NZ economy. The New Zealand agriculture, food and health are sectors that were identified in the GIF report as potentially benefiting from a successful biotechnology industry.

Development of these general purpose technologies can be used to justify government intervention as any benefits would not only accrue to the assisted firms or industry but also enable these other sectors to enhance their competitiveness. However, if seen as an enabling technology one might expect the actual interventions to target problems to do with the adaptation of biotech developments in other sectors or to coordinate activity amongst biotech firms with the specific goal of providing benefits to another sector.

Analysis

Alignment of activities with objectives

As mentioned above, NZTE activities consist mainly of coordinating NZ participation in international and domestic biotechnology conventions, and providing funding and other assistance to NZBIO.

Two of the main events NZTE has consistently targeted are the annual AusBiotech and the (US) BIO conferences. NZTE started coordinating the New Zealand attendance at AusBiotech in 2004. In 2008 AusBio was a joint event with NZBIO/NZTE coordination. The event was handed over to NZBIO in 2009. Approximately 20 representatives of New Zealand firms and organisations attend this

event each year. The activity generally involves the provision of a conference pavilion with meeting rooms, networking events and NZTE on-site support such as canvassing clients, marketing collateral, arranging meetings and assistance with hotel bookings. In addition, there is considerable effort spent on pre-event business matching and capability building to ensure appropriate meetings take place. The total cost to NZTE for this event was $90,000 in 2008. Participating client firms normally pay a contribution depending on whether they would like to exhibit at the event or only have access to the facilities. This contribution has been rising over time and was $2,250 for the former and $500 for the latter deal in 2008.

The annual BIO conference in the US involves similar activities and support by NZTE. It is, however, a bigger event, attended by a bigger delegation and costing more, approximately $400,000 (2008). In 2008, the NZTE coordinated mission consisted of 95 delegates from 45 businesses and other organisations. Of these, 20 exhibited at the event. NZTE funding went to things such as paying for a pavilion, arranging networking and business matching opportunities, and building industry capability through seminars and engagement with the North American Beachheads Advisors. As event sponsor, access to premium lounges, extra advertising and other benefits was secured. NZBIO were involved in the event as part of NZTE's exit strategy to gradually handover responsibility. It is envisaged that NZBIO will be in charge of organising the New Zealand presence at the event in 2010, albeit still financially and otherwise supported by NZTE.

In addition, NZTE organises a New Zealand presence at other, similar events in, for example, Europe. NZTE board paper business cases clearly define the main goals of these events as linking NZ businesses with international players and showcasing NZ sector capabilities. Further expectations seem to be spillovers to non-participating NZ based firms in the biotech sector and collaborations between NZ firms.

When taking the set of objectives as defined by NZTE and listed above as the yardstick, then NZTE activities seem quite appropriate. Funding for and gradually handing over responsibilities to NZBIO is an appropriate way of nurturing a successful industry body to eventually take over such tasks as the coordination of activities across the sector. Coordinating the New Zealand presence at international trade events and conventions contributes to linking firms with overseas players. They also help showcase and advertise NZ capabilities to a large international audience.

On the whole, therefore, objectives and activities appear to be well-aligned. As argued above, addressing coordination and information failures alone do not appear sufficiently convincing grounds for government intervention, given their widespread presence in other industries, too. Where spillovers are mentioned, it is in the context of NZTE activities resulting in further sector-wide wider benefits, although hard evidence of this appears to be scarce. Some board papers stress the wider impact biotech may have on other sectors, but it does not appear that any of the OC2 activities in the biotech area address obstacles that prevent the uptake of biotech developments by other sectors. Thus, the activities are not particularly well-aligned in terms of what should be a rationale for government support for biotech, as opposed to other potential candidate sectors. That said, biotech has enjoyed a great deal of ministerial support over the years, often based on the notion of it being an

enabling technology. And through its engagement with the sector, NZTE have certainly responded well to the level of priority minsters have attached to biotechnology.

Benefits

The background papers supplied by NZTE define expected benefits as introductions into new markets and the establishment of business contacts. Other goals, such as raising finance, may feature as an expected benefit but it is not clear whether they are specifically targeted as a result of having been identified as an underlying problem that warrants government intervention. Table 19 shows a list of NZTE's expected benefits for the BIO 2009 conference in the US. Other NZTE business cases supporting NZTE involvement contain similar tables (eg AusBiotech 2008).

Table 19: Expected benefits for the BIO 2009 conference in the United States

Outcome Type	Description	Expected Outcome
Business into new markets	BIO 2009 is a platform from which companies can identify new market opportunities and build new strategic relationships with key international companies	A minimum of 80 new business relationships created
Business introductions, new / improved products into market	Companies can identify new opportunities at BIO 2009 which will steer the future research and development of new solutions	A minimum of 80 new business relationships created
Businesses developing formal strategic alliances and/or joint ventures	BIO 2009 provides companies with facilitated access to meet with key biotechnology companies to start/continue strategic discussions and explore partnership opportunities	Up to 30 follow-up meetings
Increase in New Zealand's profile in the biotechnology sector	Attending companies help profile New Zealand's biotechnology capabilities. To be enhanced with a continued aggressive PR campaign	Targeted media and PR coverage. Valued at up to USD$1million in equivalent advertising dollars
New finance raised	Attending companies meet with appropriate global capital providers	Uncertain due to current global credit crisis
New FDI raised	Attending companies target appropriate investors	Uncertain due to current global credit crisis

Source: NZTE board paper: BIO 2009, October 2008

The expected benefits, as shown in the table above, are not easily measured. This makes placing a monetary value on them extremely difficult, if not impossible. NZTE attempts at monetising these benefits rely on self-reporting by attendees and assume that any business is additional to what would have happened. They also do not take

into account opportunity cost. In other words, it is assumed that firms would not have gone to the event and made the contact without NZTE involvement and that they would not have entered into any other deals with anyone else if they had not gone to the event.

Feedback from the limited number of interviews we conducted suggests that they would have gone to the events anyway but that NZTE leadership contributes significantly to networking between NZ firms themselves and as a group with overseas business partners. Several interviewees view NZTE involvement as crucial for gaining better access to other countries' government organisations, eg health providers, and multinationals. Interviewees also pointed out that other, smaller players in the industry may not have the resources to go to the events on their own, although NZTE do not fund travel and accommodation expenses as far as we have been advised for OC2 activities.

While the majority of feedback on NZTE involvement with the biotech industry was very positive and appreciative of the financial, advisory and other assistance NZTE offer, we also received feedback suggesting the importance of great care in handling of confidential information.

NZTE and MED have supported the formation of a single representative body for the industry, NZBIO. This work started in 2003 when as part of the Growth and Innovation Framework (GIF) a decision was made to provide short term funding for the establishment of industry bodies in a small number of identified industries. A review in 2006 concluded that NZBIO was the only industry body that faced realistic prospects of becoming self-sustaining. However, further funding support was needed for it to stand on its own feet. This baseline funding, being an annual grant of $400,000, has now been extended by MED until 2013. Thus, what was intended to be short term funding has become baseline funding for a period of ten years. It should be pointed out that the decision to prolong the baseline funding was made by MED.

NZTE have been working on a gradual hand-over of responsibilities to NZBIO in order to build that organisation's capabilities. There have been plans in place for NZBIO to take on the task of coordinating the New Zealand representation at overseas events and to organise the domestic conference. Recognising the skills and contacts this requires, NZTE have over the years gradually given NZBIO more responsibility by increasingly sharing the handling of tasks at such conferences with NZBIO. NZTE board papers from 2007 onwards contain a section outlining the added tasks to be given to NZBIO, with the final goal of the 'exit strategy' being the complete handover for organising the BIO US and AusBiotech conferences in 2010.

NZBIO expressed some reservations about how well the gradual handover has taken place, suggesting that there was an expectation that they'd have to do with fewer resources than NZTE had at their disposal. However, the strategy employed by NZTE to gradually share more responsibility with NZBIO is a good example of how an industry association's capabilities can be built up. The feeling by NZBIO of being resource-constrained may also be a reflection of the relative immaturity of the biotech industry, including its size and profitability, and the only limited contribution it can make to NZBIO in the form of membership fees and direct contributions to organising the New Zealand representation at conferences.

While interviewees generally thought that NZBIO had the capability and know-how to organise New Zealand conference representations abroad, one interviewee questioned whether NZBIO would be able to provide similar access to key overseas players as NZTE did. This was not a comment on NZBIO's ability to run networking activities but an observation that an organisation associated with government might be able to open doors an industry association can not. It was also observed that the costs for New Zealand firms to attend overseas events had gone up and that this might make it difficult for some to continue to attend these conferences.

Conclusion

NZTE have planned and handled the hand-over of more responsibility to NZBIO well. The exit strategy from coordinating NZ representations at overseas trade events had been planned for a number of years, with NZTE board papers clearly spelling out the gradual process of building up NZBIO experience and capability. It is also reasonable to expect the taxpayer to contribute progressively less towards the costs of these events and to expect the industry itself, or through NZBIO, to increase its contributions.

The latest baseline funding arrangements for NZBIO have been largely beyond the control of NZTE. MED's decision to extend funding until 2013 ensures that there continues to be a single channel through which the biotech industry's interests can be represented. The expectation that by 2013 NZBIO should be self-sustaining is sensible. However, it should also not be overlooked that what was initially a short term funding arrangement of three years will by 2013 have become ten years of baseline funding. Granted, the economic downturn had not been anticipated, but it does raise questions about how robust the initial case that argued for three years of short term funding was[54]. It might be that initial industry growth predictions were overly optimistic, that establishing a successful industry association in New Zealand requires more and longer public support than initially anticipated, or a combination of the two. But whatever the reason, it seems that the information upon which the initial GIF decision was made with the benefit of hindsight, was insufficient and that better information could have led to a more accurate assessment of the level of support needed.

The activities funded through Output Class 2 address possible coordination and information problems. In that sense, they are well-aligned with the objectives as defined by NZTE, although in the absence of a more detailed problem definition and intervention rationale it is not possible to properly assess whether the level of support is at the right level. However, the main reason for public support for the biotech industry that was identified as part of the GIF is its potential for being an enabling technology that could have spillover effects on other important industries such as agriculture and health. It is not clear how coordinating New Zealand firms' attendance at trade events is linked to ensuring that biotech can fulfil its enabling potential. Further NZTE support for biotech might be better aimed at identifying obstacles that prevent biotech developments from being taken up by other sectors and how NZTE can help overcome any such impediments. Given the hand-over of much of NZTE

[54] It should be noted that this case was made via a whole-of-government process through GIF, and that was external to NZTE.

activity on biotech to NZBIO, now might be an opportune moment for redirecting NZTE intervention in this area towards activities that might result in better value for money outcomes overall as opposed to firm or industry specific benefits.

8.2 Aviation industry activities

Background

NZTE's aviation activities fit under the manufacturing strategic initiative and sector projects. Cabinet indicated that the Manufacturing Vision Group's November 2005 Manufacturing Plus report is designed as an overarching framework for manufacturing sub-sectors to build their own strategies. It recognises that NZTE has been facilitating this process as part of its ongoing engagement with manufacturing industry groups, including the Aviation Industry Association. The collective vision for the manufacturing industry is to be recognised as a high performing sector, and a major and growing contributor to the New Zealand economy, shown through its increasing contribution to per capita GDP growth, foreign exchange earnings and profitability.

NZTE state that its project work drives not only industry/sector engagement, but engagement in manufacturing operations and processes of all teams at NZTE. It focuses on business transformation including improved productivity, connecting New Zealand companies to defined global opportunities of scale, and improving the way companies do business from idea generation through to commercialisation and international success. NZTE states that its aviation sector project focuses on assisting the sector to transform itself from a commodity dependent industry into a more specialised, globally-connected, high margin, sustainable service and manufacturing industry.

Intervention logic and objectives

The aviation project funded the establishment of Aviation New Zealand. Its objectives are:

1. Identifying and validating business opportunities of scale which reflect the aspirations of its New Zealand supporters that might not exist for companies operating alone.
2. Working with sector champions and developing ad hoc groups for potential business opportunities, addressing barriers, and building collaborative responses/packaged solutions to convert them into reality.
3. Developing the Aviation New Zealand brand as the reference point on New Zealand capability.
4. Providing an umbrella brand under which companies can operate internationally.
5. Acting as a one stop shop for international companies wishing to do aviation.

The objectives therefore relate to a better performing and more sustainable aviation industry. They do not explicitly link with wider economic objectives. A more specialised, globally connected, high margin, sustainable industry would be

consistent with improvements in overall economic performance if this raises productivity in the industry without lowering productivity in other sectors, and the net productivity improvement outweighs the cost associated with the government assistance through NZTE. Ultimately, whether this is possible will depend on a confluence of factors, including the capacity and willingness of the industry to substantially transform itself, global competition and market demand for aviation goods and services, the effectiveness of NZTE assistance, and the opportunity cost in terms of foregone productivity of the resources that flow from other industries into the aviation industry as a result of the transformation.

The objectives given are not explicitly linked to potential market failure or spillover rationales. A robust market failure or spillover rationale would point to barriers or opportunities that could be addressed through specific interventions that would lead to increased productivity or activity that would not have occurred in the absence of government intervention and this would lead to a net positive benefit for the economy as a whole.

Alignment of activities with objectives

Through Aviation NZ, NZTE funds several broad types of activities:

- Discrete projects such as the Singapore Air Show.
- Developing collaborative partnerships between firms in the New Zealand aviation industry and international aviation companies.

The aviation programme is complemented by Lean Manufacturing workshops and improving supply chain knowledge to support Altitude in developing new capability and capacity to meet their international growth demands to refurbish Boeing Business Jets in New Zealand and retain as much of the value as possible in New Zealand.

These activities seem to address the objectives outlined for the aviation industry. Specifically:

- International events, such as the Singapore Air Show, provide opportunities for firms in the aviation industry to raise their brand awareness and network with potential customers and supply chain partners. The activities therefore address the objective for the aviation industry to be more globally-connected.
- Efforts to develop collaborative partnerships between New Zealand aviation firms and overseas firms are consistent with the objective to be more globally-connected and achieve scale, which in turn may lead to a more sustainable industry.

The broader issue is, however, the extent to which the activities can achieve a significant transformation in an industry that faces substantial global competition and in which New Zealand in many areas is likely to have limited comparative advantage.

A representative of the aviation industry suggested that the area that is likely to have the biggest transformational impact in the industry is convincing the maintenance,

overhaul and repairs part of the industry to become more specialised so that it can be a bigger player in OEM contracts.

The CEO of an aviation firm that is playing a significant role in Aviation NZ activities suggested that one of the areas that NZTE can add the most value is in facilitating contacts and negotiations in overseas markets, particularly in South-East Asia and the Pacific. In these markets it is often critical that New Zealand companies are seen to be sanctioned by the government and have its support. The consulates and NZTE can play an important role making contacts in overseas markets and helping with translation and cultural interpretation.

Two interviewees suggested that NZTE funding through Aviation New Zealand should be selective about its focus, rather than attempt to spread its efforts across a number of areas. Specifically, it should concentrate on facilitating collaborations between New Zealand aviation firms and connecting them with potential customers and supply chain partners overseas, particularly in South-East Asia and the Pacific.

One senior industry interviewee suggested that in some areas NZTE has been unhelpful to the industry. This has usually been the result of NZTE not having a good handle on what generates sustainable value and activity in the industry. The interviewee felt that NZTE may be diverted by what appears to be "sexy" areas of the aviation industry – pointing to Aerospace and Alpha Aviation as failures in this regard. High potential firms in less high-profile areas such as the design and manufacture of high tech fittings and components and subsidiary systems (eg baggage handling) can be overlooked. The interviewee suggested that NZTE needs to take a more strategic approach, look at the detail of activities and how they fit with supply chains around them, what collaborations are needed, and the detail of how firms are going about their businesses.

Another interviewee highlighted the NZTE funded mission to India as an NZTE initiative that was done well – "targeted, knew who clients were, not 'scatter-gun'". The interviewee commented that initiatives like this need to be strategic, targeted, and participants and facilitators need to be patient – repeat visits and contacts are needed over a period of time.

Another senior industry person suggested that there is considerable scope for New Zealand aviation firms to establish and grow in niche high value areas and that NZTE assistance in facilitating collaborations and overseas contacts could potentially add significant value in this regard.

An aviation industry representative said that the governance model for the industry needs to change to be more collaborative. The representative suggested that opportunities for the industry are being missed because firms are competing with each other when collaboration would likely result in better outcomes for all firms. Moreover, there needs to be improved alignment between government agencies providing industry assistance, such as NZTE, the Foundation for Research, Science and Technology and other industry support agencies.

Benefits

In terms of concrete deals the aviation programme has yet to deliver significant benefits to individual firms, which is acknowledged by the industry representatives spoken with as part of this evaluation.

The benefits NZTE highlight in its reporting on the aviation project include:

- At the Singapore Air Show seven New Zealand exhibitors reported a total of 84 leads, conservatively worth $54m. Aviation NZ relationships with a number of Vietnamese and Indian prospects were further cemented at the show.
- Helping establish a JV with the Indonesian Pilot Training School for rotary training under NZ CAA certification.
- Working with four companies to establish a collaborative proposition to sell flight training, provision of aircraft, aircraft engineers and funding to Vietnam Airlines.
- Three firms collaborating to sell to Oberlin, a Japanese University (negotiations in progress).

An aviation industry representative indicated that NZTE funding allows Aviation New Zealand's activities to have impact. For example, collaborative efforts in Vietnam and India would not have been effective if NZTE had not supported them. The aviation industry has too many small players and does not have the resources or capability to undertake large collaborative deals with overseas parties by itself.

The aviation industry representative said one of the biggest benefits of Aviation New Zealand activities was the enabling of collaborations among New Zealand aviation firms. The representative cited pilot training to Vietnam Airlines, which although unsuccessful, resulted in CTT working with a Hastings aviation company which it would not have otherwise worked with. Aviation New Zealand gets aviation companies in the New Zealand industry to provide total solutions to overseas customers through collaborations, thereby securing higher value contracts.

A senior industry contact pointed to a successful deal involving a rotor helicopter training programme attached to OEM sales. NZTE commissioned the feasibility study, helped develop the business case, and assisted with negotiations and contracting. The programme receives $350,000 per pilot trained in New Zealand.

There is not enough evidence to conclude wider economic benefits from the aviation programme. The lack of significant concrete deals so far would suggest that wider economic benefits would be small, or perhaps negative if the opportunity cost of the support and the costs of the programme (including foregone investment from firms) are factored in. Future benefits may increase to the extent that greater industry collaboration and networking creates higher productivity in the industry.

Spillovers

Based on the NZTE reported benefits there was no evidence of spillovers. The report indicated that to better understand spillovers, NZTE has commissioned a report that aims to benchmark the industry now so that its effect on the overall New

Zealand economy can be assessed, and the industry can be benchmarked again in the future using the same data sources and methodology.

Conclusion

The objectives for NZTE's aviation project are focused on a better performing and more sustainable industry. They do not appear to have clear links with wider economic performance or market failures or spillovers. However, the focus on facilitating industry collaborations and contacts in overseas markets where government sanctioning is important gives some ex post justification on a market distortion basis.

The activities of NZTE, primarily through Aviation NZ, appear to be reasonably well aligned with its objectives for the aviation industry. Feedback from industry contacts suggests that Aviation NZ should keep most of its focus on activities that facilitate collaborations in the industry. An important part of these efforts is making contacts and providing official support in overseas markets, particularly South-East Asia. Some feedback suggests that aspects of NZTE involvement have been unhelpful to the industry and that it should be more strategic about what adds long-term value.

Few commercial deals have eventuated out of NZTE/Aviation NZ involvement in the industry so far. This suggests the wider economic benefits of the programme may be small or negative. However, industry feedback indicates that progress is being made in making the industry more collaborative and improving industry networking, which may enhance the probability that there are wider benefits to the industry and the economy in the future.

8.3 Connect New Zealand

Background

In November 2006, the NZTE Board approved a budget of $1.3 m up to June 2009 for Connect New Zealand (Connect NZ). This extended support funding to the Connect project following on from successful pilot projects in Auckland and Canterbury established in February 2005. The primary focus for Connect NZ was to support the growth of technology companies (ICT, Life Sciences and Specialised Manufacturing) that are too early in their life cycle to engage intensively with the NZTE sector teams. NZTE stated that its involvement in Connect NZ was necessary to seed fund the programme and to support it to a point where the local government and private sector funding contributions would sustain the operation.

After a review of its activities and projected funding sources at the end of 2007, the Board concluded that in the prevailing economic environment it was not possible to reach its target of being fully private sector funded by 2009/10. It therefore decided to wind down Connect New Zealand's operations during the first quarter of 2008, with operations ceasing from 1 April 2008.

Intervention logic and objectives

Connect NZ's business cases state two key objectives for its establishment and support – "to enable the successful growth of NZ technology and life sciences companies in offshore markets and enhance technology commercialisation".

The November 2006 Connect NZ Extension Business Case 2006-2009, states that Connect was established to address two key growth barriers in the New Zealand technology sector. These are poor survival rates of SME technology companies, and inadequate levels of commercialisation of industry related research and intellectual property. It stated that:

- "[Firms] are pursuing sub-optimal growth strategies, primarily as management have a limited understanding of their target markets and are unable to clearly explain or justify a go-to-market strategy".
- "Companies under-estimate the cost – in terms of money, time, and diffusion of focus – of developing new markets".
- "Management teams lack experience of internationalisation and market entry tactics, but are still unwilling to seek assistance from knowledgeable services or practitioners".
- "Management teams are not focused on the key barriers and opportunities for growth and have often not thought through and resolved their own aspirations and objectives for their business".

The Extension Business Case states that Connect is also addressing the fragmentation of support services by bringing the many disparate groups together and establishing new relationships and business opportunities between key providers such as the tertiary institutes and business community.

In summary, the rationale for Connect NZ has three key elements:

1. Addressing a lack of information available to new technology companies on potential markets and commercial barriers and opportunities.
2. Addressing a lack of awareness among new technology companies of networks and collaborations needed to successfully commercialise their activities.
3. Addressing a lack of management capability among new technology companies in understanding their markets and developing effective commercial strategies.

In Connect NZ's 2007-2008 Business Plan, NZTE describe the barriers facing technology SMEs in New Zealand as "market imperfections". Although the rationale given for Connect NZ can be seen to be linked to market failures there does not appear to be any New Zealand evidence that supports this. New technology companies are inherently risky and their failure rates are high. This does not necessarily prove that there are market failures in the sector as there could be many different reasons for the high failure rates unrelated to market failures[55]. The nature of the business, the stage of its life-cycle, and its range of options for taking

[55] Examples of non-market failure reasons for high failure rates include innovations that do not live up to expectations, market demand for a new technology that never eventuates, and changes in technology or in markets that overtake the usefulness of a particular innovation. Even factors such as lack of capability of managers of technology firms to collaborate and commercialise are not necessarily signs of market failure.

innovations to market need to be considered before conclusions can be reached about the perceived barriers it faces.

It would be desirable to assess the extent to which New Zealand technology firms experience barriers that are significantly larger than technology firms overseas and the reasons for these as a pointer to potential market failures facing the sector here. For instance, are there barriers to the establishment of adequate angel investment or venture capital markets and which types of firms are particularly affected by this? Does New Zealand unduly suffer from its distance from potential overseas markets, high costs of gathering information on those markets, and the lack of scale conducive to development of the private sector specialists and intermediaries necessary to fill the critical information gaps? If the answer is affirmative to these questions, what are the policies that most effectively address the barriers at source?

Alignment of activities with objectives

To efficiently address the barriers identified by NZTE, such as information or coordination problems in emerging technology activities government interventions need to cost-effectively tackle the distortions at source. To the extent that the barriers highlighted by NZTE are valid market distortions a portfolio of activities is needed, focused on facilitating collaborations, investments and networks that are critical to the ongoing commercial success of the new technologies developed by small technology firms, and raising the capability of managers to plan strategically and use available market information productively. To a large extent Connect NZ's activities, such as springboard roundtables, technology briefings and showcases, and network and capability development events appear to have these focuses.

The Connect New Zealand Extension Business Case 2006-2009, mentions that Connect will continue to work closely with key initiatives such as the NZTE Beachheads and Escalator programmes to help develop company capability prior to engagement with these programmes. It suggests that by engaging with Connect early in their development, companies will be far better prepared to take maximum advantage of established market entry and capital raising programmes. Although certain specialist skill-sets would be required to support firms in the early stages of their development relative to those that are more investment ready, there would also appear to be the potential for synergy, coordination and economy of scale benefits in having support for both groups integrated within one programme. The question, then, is whether it may have been more cost effective to expand the Beachheads and Escalator programmes to cater to firms in the earlier stages of their development rather than establish a separate entity in Connect NZ?

Benefits

NZTE stated that the expected total net economic benefit (NEB) from Connect NZ would be $146 m over the period 2006 to 2011. The forecast net economic benefits presented by NZTE in relation to Connect can be seen as the potential net financial benefits accruing to technology firms participating in Connect NZ activities based on certain assumptions. They cannot be interpreted as net economy-wide benefits, as the term perhaps misleadingly suggests. Economy-wide benefits will include the gains from activity that would not otherwise have taken place in the absence of

support, and after accounting for the opportunity cost of the resources in the economy reallocated to supported firms and the cost of the funding for the support.

Benefits stated by NZTE

In November 2006 NZTE forecasted that net economic benefits (NEB) would be as follows.

Year	2006/07	2007/08	2008/09	2009/10	2010/11	Total
Number of companies	13	16	19	19	19	
Potential total additional revenue	$5m	$13m	$34m	$60m	$93m	$205m
Potential total NEB	$3m	$9m	$24m	$43m	$67m	$146m

NEB is defined as total additional revenue x (gross margin + labour cost percentage x cost percentage), where the term in parenthesis is equal to 72 percent.

NZTE states that the growth forecasts are a blend of what can be expected from successful technology companies and the data from other established Connect networks. It suggests that over the longer term it is realistic to expect an increase in the volume of IP that will be commercialised from New Zealand research institutions as Connect builds linkages between the private sector and the institutions through targeted programmes such as Technology Briefings and Technology Showcases.

In the absence of quantitative evidence, qualitative evidence is provided from surveys of Connect NZ clients. This gives an anecdotal sense of Connect NZ's performance in relation to the benefits received by individual clients. Based on client survey information and the records of Connect NZ, the benefits derived include the following:

- A number of respondents reported that Connect NZ activities significantly helped them clarify their business strategy and planning.
- A number of firms reported that they increased their revenue projections after Connect NZ engagement. It was unclear from the survey information provided why this was the case.
- A number of firms reported that they raised capital as a result of attending Connect NZ organised events. Most of these firms reported that they raised the extra capital from family or existing shareholders, while two firms reported raising extra capital from unspecified sources.
- All survey respondents reported they were happy with Connect NZ assistance and events and would approach it again.

In the period January 2007 to September 2007, Connect NZ met its targets relating to registering new companies, events and surveys. It did not meet its targets of roundtables due to a lack of personnel.

Surveys of participants of Connect NZ roundtable/showcase events indicated a high level of satisfaction with the timeliness, quality, and professionalism of the events.

It is difficult to assess the concrete industry and wider net economic benefits of a programme such as Connect NZ because we cannot be certain of the outcomes that would result in the absence of the programme. For instance, in the absence of Connect NZ supplying networking, information, and capability services, the technology sector or angel investment companies may have been better motivated in organising to fill the gap. Alternatively, small technology firms may have been taken over sooner by larger firms with greater management capabilities and stronger overseas networks.

If a high rate of net benefit growth eventuates, as NZTE forecasted, there would be a high likelihood that there would be a net positive impact on the overall economy. However, the critical factor in terms of assessing the impact of Connect NZ is the extent to which its activities contributed to the gain. Surveys of participating firms suggest the area where they got the most significant benefits was in clarifying their business strategies and raising capital from family or existing shareholders. While obviously helpful, this suggests that perhaps Connect NZ's influence was not critical to the large growth in net benefits. If most of the gain would have occurred anyway, the net economic benefit attributable to the policy interventions would likely be small.

Ultimately, if the technology based SMEs sector sees a high degree of value in the services Connect NZ provides, in time we would expect to see a good degree of financial support for it from the sector. Connect NZ fell significantly short of its target of $238,000 per annum for direct private financial sector support. This was no doubt partly due to the economic downturn, which would have substantially diminished discretionary funding from small technology firms. But it may also have been due to the target sector and private investors in the sector not seeing critical value from Connect NZ support.

NZTE noted that New Zealand now has a much stronger Angel Network and early stage investment fund through NZVIF. This would presumably mitigate, to a certain degree, the information/coordination problems foreseen at the inception of Connect NZ, thus reducing the policy relevance of the programme. However, some streams of activity have been taken up by other organisations (eg Canterbury Development Corporation still run the Connect roundtables for early stage companies).

Spillovers

NZTE in its reporting on Connect NZ in November 2006 refer to potential spillover benefits from the delivery of Connect NZ programmes including:

- Improved linkages between many of the core service providers, which creates opportunities for knowledge sharing and business referral.
- Increased levels of trust between companies as learnings and knowledge are shared through educational seminars and networking functions.
- Increased profile for New Zealand through the emerging Global Connect Network.
- A strong referral network back to Connect is encouraging many companies to seek advice early rather than working in isolation.

These are all valid potential spillovers. It is conceivable that Connect NZ could have resulted in their realisation. However, it is not possible to ascertain from available information their extent in relation to technology SMEs. A comprehensive study comparing participating firms with other firms that did not receive Connect NZ assistance would be required to assess spillover benefits.

Conclusion

There are potential links to market failure and spillover rationales for the types of activities associated with Connect NZ. However, there does not appear to be any evidence that backs the existence of specific market failures and spillovers related to technology SMEs in New Zealand. New technology companies are inherently risky and their failure rates are high. This does not necessarily prove that there are market failures in the sector. The nature of the business, the stage of its life-cycle, and its range of options for taking innovations to market need to be considered before conclusions can be reached about the perceived barriers it faces.

The objectives of Connect NZ and its activities seemed to be well aligned. The bulk of activities were targeted at some of the problems identified in the technology SME sector, such as a lack of information on market opportunities and commercial barriers, a lack of awareness of networks and collaborations critical for commercial success, and a lack of management capability in strategic planning. However, there is a question about the extent that Connect NZ's activities were filling a gap in government support for technology firms and how it fits with NZTE's Escalator programme.

It is difficult to assess the concrete industry and wider net economic benefits of a programme such as Connect NZ because we cannot be certain of the outcomes that would result in the absence of the programme. It appears from surveys that Connect NZ's assistance would not have been critical to high growth in firms that participated in its activities. Spillover benefits are conceivable, but there is no way these can be ascertained without a comprehensive study comparing participating firms with other firms that did not receive Connect NZ assistance.

8.4 International supply chain integration including defence and security

Background

As with NZTE's aviation activities described above, NZTE's defence and security activities fit under the manufacturing strategic initiative and sector projects. Cabinet indicated that the Manufacturing Vision Group's November 2005 Manufacturing Plus report is designed as an overarching framework for manufacturing sub-sectors to build their own strategies. It recognises that NZTE has been facilitating this process as part of its ongoing engagement with manufacturing industry groups. The collective vision for the manufacturing industry is to be recognised as a high performing sector, and a major and growing contributor to the New Zealand economy, shown through its increasing contribution to per capita GDP growth, foreign exchange earnings and profitability.

NZTE state that its project work drives not only industry/sector engagement, but engagement in manufacturing operations and processes of all teams at NZTE. It focuses on business transformation including improved productivity, connecting New Zealand companies to defined global opportunities of scale, and improving the way companies do business from idea generation through to commercialisation and international success.

Intervention logic and objectives

NZTE state that New Zealand companies have the capability to supply defence and security markets and work with NZTE global offices to connect business to defence and public sector procurement opportunities in the defence and homeland security market.

The defence and security markets are dominated by government involvement and are heavily influenced by non-market factors. Entry and success in these markets is likely to require some level of official intervention to discover and open channels for New Zealand firms.

On the other hand, for the benefit of the wider economy it is desirable that New Zealand firms only receive assistance if they have comparative advantages and by assisting them there is likely to be a net economic benefit, after accounting for the opportunity cost of the government assistance and the cost associated with the funding. In this regard the rationale given for NZTE programmes in the defence and security area does not make any clear link to wider economic objectives or addressing market failures or spillovers.

It would be worth gaining understanding of the parts of the New Zealand defence and security industries that have the most potential in terms of growth and successfully filling global market niches, the specific barriers they face, and which interventions are most likely to successfully address them at their sources. A broad-brush approach, focusing only on opportunities, probably results in benefits for individual companies but risks producing small or negative net overall outcomes.

Alignment of activities with objectives

NZTE engages in a number of activities in the Australian and North American defence and security markets. In the Australia market NZTE assists to promote New Zealand's capability and companies at a variety of defence and security events to:

- Develop New Zealand industry credibility and commitment with potential partners and procurement agencies in the defence and security market.
- Accelerate direct company success demonstrated by introductions, leads and deals.

NZTE works with the NZ Defence Industry Association to encourage collaborative capability building and offshore marketing initiatives. NZTE has sponsored policy analysis work and has encouraged the association to formulate an industry plan.

In North America, NZTE is assisting New Zealand defence and security firms in the fast growing North American Homeland Security and Public Safety markets. NZTE's specific focus is to:

- Build on existing relationships and develop new ones with Federal, State and Local Government agencies.
- Work with offshore teams to organise attendance and participation at key events.
- Develop New Zealand industry credibility and commitment with potential partners and procurement agencies in the North American homeland security and public safety market.

Given the absence of clear overarching objectives for the defence and security project, alignment with activities cannot usefully be assessed. However, the activities appear to be focused in areas where NZTE might be expected to have relevant expertise and comparative advantage. In particular, NZTE's efforts building relationships with overseas government agencies, facilitating collaborations within and across relevant New Zealand industries, and assisting with attendance and participation in key overseas events would no doubt draw on generic knowledge and contacts in the organisation.

Benefits

A range of benefits from NZTE activities are outlined in its reporting, including creating networks, demonstrating New Zealand capability in markets, and forging new business relationships. Concrete commercial deals include:

- A New Zealand and US company have teamed on a $US 37,000 aviation contract related to a US-supported project in Iraq.
- After attending a Security Network forum, another New Zealand company signed a re-seller agreement with a UK vendor which has led to $5-7 m in annual sales.
- After attending a Security Network forum, Telecoms Forensics signed a contract with Canadian law enforcement for an undisclosed amount.

In addition, NZTE estimate that participating companies will achieve upwards of $114 m in additional revenue from US government defence and security agencies as a result of the NZTE Immersion Programme and other activities and support. This was based on company activities to date and projected revenue.

As with other programmes, it is difficult to assess the extent to which the deals reported were the result of NZTE activities. To the extent that access to overseas defence and security organisations was only possible through government-to-government liaison then it is likely that the activities played a significant role in the benefits participating companies received. However, it is not clear from information available the extent that deals were the result of existing relationships and how critical NZTE programmes were to tying them up.

It is also not possible to assess the wider economic benefits of the defence and security programme from the available information. However, given that specific deals are at this stage relatively small, there is probably no discernible wider economic benefit.

Spillovers

It is not possible to discern any spillovers from the available information. It is possible that the efforts of NZTE to facilitate access to overseas government defence markets have paved the way for deals that would not occur in the absence of the interventions.

Conclusion

There does not appear to be clear objectives for activities under the defence and security project apart from a view that there is potential for New Zealand firms to supply overseas defence and security markets. On the one hand there would appear to be a need for government involvement to clear a path for New Zealand firms in a heavily government dominated industry. But on the other hand it is desirable that any assistance to defence and security firms will likely lead to a net overall economic benefit.

NZTE activities appear to be focused in areas where NZTE might be expected to have relevant expertise and comparative advantage, drawing on its knowledge and contacts gained in other areas. Activities appear to have opened doors and gained exposure for defence and security firms, although evidence of concrete deals directly emerging from them is light at this stage. It is not possible to discern wider economic benefits or spillovers based on the available information.

8.5 Marine industry activities

Background

As is the case with NZTE's aviation and its defence and security activities, NZTE's marine activities fit under the manufacturing strategic initiative and sector projects. Cabinet indicated that the Manufacturing Vision Group's November 2005 Manufacturing Plus report is designed as an overarching framework for manufacturing sub-sectors to build their own strategies. It recognises that NZTE has been facilitating this process as part of its ongoing engagement with manufacturing industry groups, including the Marine Industry Association.

The collective vision for the manufacturing industry is to be recognised as a high performing sector, and a major and growing contributor to the New Zealand economy, shown through its increasing contribution to per capita GDP growth, foreign exchange earnings and profitability.

NZTE state that its project work drives not only industry/sector engagement, but engagement in manufacturing operations and processes of all teams at NZTE. It focuses on business transformation including improved productivity, connecting New Zealand companies to defined global opportunities of scale, and improving the way companies do business from idea generation through to commercialisation and international success.

In the marine area, NZTE expenditure on activities in the period 2007/08 to 2009/10 totalled $1.6 m. Of this $1.4 m was for international market development, $227,000 for capability development and training, and $16,000 for marine network excellence.

NZTE objectives for the marine industry

The marine industry sits under NZTE's manufacturing Strategic Initiative. Programmes are therefore guided by the Government vision for the manufacturing sector, which is "manufacturing is recognised as a high performing sector, and a major and growing contributor to the New Zealand economy". There appears to be no high level goals or vision specifically for the marine industry. However, NZTE activities seek to work with industry to:

- Maximise market development opportunities for the sector as a whole.
- Address barriers and capability issues of individual sub-sectors.

Intervention logic and objectives

The vision for manufacturing is high level and non-specific in terms of underlying problems that need to be addressed in manufacturing. The Manufacturing Plus report, from which the vision is derived, discusses manufacturing performance relative to other sectors in the economy and in the context of competition from manufacturers in low cost countries, and New Zealand's exchange rate fluctuations. However, there is no mention in the report of whether these are barriers that reflect specific market failures or spillover externalities. Rather the vision and content of the report suggests the desirability of a growing and well-performing manufacturing sector for the longer-term health of New Zealand's overall economy, although evidence of this link is not presented.

It is possible to conceive of potential market failures or spillovers specific to the manufacturing sector. There may be a lack of information and capability for small emerging firms to make upstream and downstream industry connections necessary for the success of their activities, particularly when the industry benefits from scale economies and geographical proximity. In this case there may be a role for government intervention. New Zealand manufacturing may or may not exhibit market failures of this type. Ultimately this would be revealed by a detailed assessment of the barriers manufacturers face, the nature of manufacturing activities, and the investments and market characteristics required to make them successful. The Manufacturing Plus report refers to a number of barriers the manufacturing sector faces, but does not discern whether these are consequences of natural barriers within well-functioning markets or a product of particular market failures or externalities.

The NZTE objectives for the marine industry, like the overarching vision for the manufacturing sector, express the desirability for good performance in the marine industry. They focus mainly on discovering market opportunities, making global connections, improving business processes, and raising industry capability. However, it is not clear from the available documentation how these objectives address market failures or the areas critical to improved performance in the marine industry.

Alignment of activities with objectives

NZTE activities related to the marine industry include:

- Euro-based marine engineering focus centre, which sought to identify opportunities to showcase New Zealand marine capabilities across a variety of marine products and services (2006/07).
- Business process transformation, business capability, and global networking (2007/08 - under the Specialised Manufacturing Strategic Initiative).
- Partnership agreements with the Marine Industry Association (MIA) and New Zealand Marine (NZM) to improve business process, integration with global value chains and partnership with NZTE offices globally (2007-10).

It is difficult to assess the degree to which the broad activities outlined above are aligned with the objectives for the marine industry. At a high level they would appear to be well aligned, being focused on discovering market opportunities, making global connections, improving business processes, and raising industry capability.

Feedback from interviews of three heads of marine companies indicates that the NZTE overseas branding exercises through trade shows and networking events are valued by their companies and others in the industry. One interviewee suggested that the branding activities for the industry, although generally done well, could be improved further if New Zealand Marine had more control of them.

The interviewees mentioned that NZTE generally did a great job and are good to deal with. Another said there had been a positive shift in NZTE in recent years as it was holding on to good staff. NZTE staff members were building good rapport and knowledge in the industry and showed business savvy. Programmes were becoming well targeted. One interviewee, although echoing the generally positive message about NZTE, mentioned that the paperwork to get assistance was onerous and that he had noticed some big errors in terms of who got assistance in the industry (this could be interpreted as meaning he considers some firms received assistance which perhaps they should not have). Another suggested that NZTE needs to be more proactive and effective at advertising the programmes that are available to the industry, particularly for new exporters.

For the future, two of the interviewees indicated that NZTE should sustain what it does in the industry – help export drive, fund trade shows, marketing initiatives, Lean Manufacturing courses, and Beachhead programmes. The interviewees mentioned that there was scope for more industry input and leading of activities. One suggested that NZTE should perhaps focus on the bigger picture and give budgets to the industry with objectives that could then be monitored.

Benefits

NZTE report that over the period 2007-10, 135 companies will participate in its activities, potential deals arising from the activities will total around $982 m, and 958 commercial leads will be created.

None of the three marine industry contacts interviewed referred to significant deals that could be attributed to their firms participating in NZTE activities. However, all three indicated that NZTE branding and market development assistance provided considerable value to their firms and the industry. One contact indicated that turnover at his firm had not increased over the last three years in which it had received NZTE market development funding, but exports had gone up at least 30 percent per year in that period. Another contact said that his firm's sales had also increased at least 30 percent per year since 2003 when it first started receiving NZTE Enterprise assistance. He considers that the results would not have been what they were without the assistance.

Another contact said that the NZTE programmes that his firm had been involved in were targeted at the industry as a whole rather than his particular firm (trade shows and exhibitions). His firm had met the costs of attending these events. Nevertheless, he sees significant benefits for the industry from the strong New Zealand brand that has been created for the industry, although these have been obscured by the effects of the economic downturn.

Two interviewees said that they did not see alternative funding for the types of activities NZTE provided. This is because firms in the industry were too small and had too few resources and capability to fund such activities. Results would not have been what they were without NZTE funding. One suggested that the branding and networking activities would still continue for more established players, but less established firms and new exporters would miss out. Also, with firms doing their own thing, New Zealand would be seen less as a collective and the NZ brand would be less powerful.

Another interviewee mentioned that ongoing direct NZTE support for marketing and networking is necessary in global markets where many competitors from other countries are receiving considerable government support.

Spillovers

NZTE point to increased exports in the super yacht sub-sectors as being a source of spillovers as it looks to adjacent sectors of manufacturing for specialised skills. This definition of a spillover does not have a market externality interpretation[56], but rather refers to flow-on activities that may or may not have a net positive impact on overall economic growth once the effects on other industries and the costs of government funding are taken into account.

[56] In a public policy sense spillovers are generally defined as new activities that generate benefits for parties not directly involved with the transactions associated with activities. For example, new firms starting within a certain proximity to each other may create a critical mass of activity that generates productivity enhancing ideas and interactions between firms in the area. According to this concept spillovers do not include the flow-on activities generated from new activities such as new business and jobs created for firms supplying inputs to the new activity. This is because flow-on activity is not necessarily evidence of additionality – extra growth resulting from resources being reallocated from one area to another.

Conclusion

The NZTE objectives for the marine industry focus on discovering market opportunities, making global connections, improving business processes, and raising industry capability. The objectives are industry-centric. There is no explicit link between the objectives and wider economic objectives and there are no explicit market failure or spillover rationales underpinning them.

NZTE activities directed at marine appear to be aligned with its objectives for that industry. Feedback from three heads of marine firms suggests that the industry sees considerable value from NZTE activities, particularly the marketing and networking events, specific enterprise assistance relating to marketing and exporting, and the Lean Manufacturing courses. Feedback indicates that more industry leadership of branding activities may improve the effectiveness of branding and marketing events. NZTE staff and delivery of programmes were praised, although administrative requirements were often seen as onerous.

Concrete benefits in terms of confirmed deals as a direct result of activities in the marine area are limited at this stage. However, marine firms see considerable benefits from NZTE activities, both at the individual company and industry levels. They consider that without NZTE support for overseas marketing and branding activities emerging firms and new exporters would likely miss out on benefits. Without NZTE branding activities there would likely be more disparate overseas branding efforts in the marine industry and the New Zealand brand would lose its power.

It cannot be ascertained from the available information and feedback from the marine industry whether the benefits accruing to the industry are net additional to the economy as a whole.

9. Findings: Sector Programmes

Chapter 10 presents findings on the following six sector programmes:

- Futureintech
- Lean Business
- Manufacturing Plus
- Better By Design
- America's Cup Leveraging Programme
- Food and Beverage Sector Activities

9.1 Futureintech

Background

Futureintech is a government funded programme to encourage New Zealand students to pursue careers in science, technology and engineering. It was introduced in 2003 as part of the GIF, following a recommendation by the ICT taskforce. NZTE administers the programme and it is delivered by the Institute of Professional Engineers New Zealand (IPENZ). The annual budget has remained constant at $1.2 million per annum.

Programme description

Futureintech acts as a facilitator between schools in or near urban centres, industries and universities to promote careers in engineering, science and IT. It conducts two main activities: (1) engaging with students within the classroom and (2) providing information to students, teachers and parents on possible study and career options within these professions.

School-based activities are facilitated through facilitators who are based mainly in urban centres[57]. Although schools have to initiate the contact, once established, facilitators arrange for ambassadors to enter schools to talk to and interact with students, either on a one off or on an on-going basis. Most ambassadors, who have to undergo training prior to working with pupils, visit schools once a week for a period of between four weeks and two terms. The profile of an ambassador is typically that of a young, New Zealand trained professional. Ambassadors do not get paid by Futureintech but are volunteered by their employers. Futureintech works with over 300 firms and 500 ambassadors providing 4000 hours of work (2009 figures).

Facilitators and ambassadors must be invited by the school. While the programme was initially marketed to principals and teachers, its popularity is such that it is now often spread by word of mouth. The programme provider, IPENZ, reported that significant demand was putting some pressure on its resources.

[57] Note that one facilitator is based in Tokoroa.

The activities provided in classes are age targeted. Primary students are introduced to science and maths in a fun and informal environment, with simple experiments and hands-on activities. The relevance and applications of school-based maths and science is highlighted to lower secondary students. Upper secondary students are engaged by emphasising future education pathways and career prospects and by offering on-going assistance for individual projects (eg Scholarship Technology Projects).

Significant emphasis is also placed on providing information to teachers, parents and school career counsellors; and attending career events in schools. Much of the information is provided in pamphlet or poster form, funded by Futureintech or in conjunction with industry providers.

Discussions with IPENZ revealed that the programme is only directly available in or near urban centres where facilitators are available. However, Futureintech does distribute publications throughout NZ and programme resources can be ordered at a cost via its website.

Intervention rationale and programme objectives

There is a view, supported by some research and international comparisons, that the industries targeted by the programme suffer from skills shortages. The Futureintech website states that New Zealand has the lowest rate of engineering graduates in the OECD. Whereas the OECD average for the proportion of graduates leaving university with an engineering degree is 15 percent, it is only five percent in New Zealand[58]. The contrast to South Korea, a country with a similar GDP per capita to New Zealand, is even starker: 30 percent of graduates in that country obtain an engineering degree. In addition, there is anecdotal evidence that a high proportion, possibly up to 30 percent, of graduates in engineering leave New Zealand within the first three years of graduating[59]. The picture is similar for ICT and science graduates.

In a properly functioning market a dearth of engineers (or scientists or ICT professionals) drives up their salaries. This should incentivise school-leavers to study the subject, leading the market to move back towards equilibrium. Indeed, it is sometimes asserted that the perceived shortage in the target areas may be due to relatively poorer remuneration prospects. If true, then this would suggest a problem with the functioning of the market.

Remuneration prospects for graduates do not appear to suggest that there is a widespread failure in the sense of the market producing the 'wrong' signals. As shown in Table 20 below, law and engineering offer the best remuneration prospects, with law being ahead of engineering, both upon graduation and three years later. A career in engineering and IT is equivalent to a career in health and slightly better paid than one in commerce. The gap is widest when comparing the financial rewards of a career in the natural sciences with one in law initially it is at $4,700 per annum but then increases to $9,400 after three years. The gap to commerce and, to a lesser extent, ICT, is not too significant.

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[58] http://www.futureintech.org.nz/about.cfm.
[59] 'Engineers in the New Zealand Labour Market', Department of Labour et al, available at: http://www.gol.govt.nz/services/LMI/tools/sillsinsight-ipenz-project.asp.

Table 20: Post-study earnings for young leavers completing bachelor's degrees in 2003[60]

	One year post-study		Three years post-study		Earnings increase	
	Median $	% national median	Median $	% national median	$	Proportion %
Natural sciences	32900	1.23	42200	1.47	9300	28
ICT	33900	1.26	46000	1.60	12100	36
Engineering	37200	1.39	47800	1.66	10600	28
Health	38100	1.42	47000	1.63	8900	23
Commerce (econ accy)	33700	1.26	43900	1.52	10200	30
Law	37600	1.40	51600	1.79	14000	37
Political Science	31500	1.18	40800	1.42	9300	30

These figures show that while the lack of engineers, scientists and ICT professionals has not driven salaries higher than in equivalent professions, the notion that poorer pay prospects have a negative impact on career attractiveness is also not correct, at least not as far as engineering and IT are concerned. In summary, there is no significant pay gap that alone could explain the reasons why more young people do not choose a career in these professions. This suggests that there are other complexities at play.

One possible explanation for the lack of science, engineering and ICT graduates is the belief that these subjects are relatively difficult to study. That belief and a negative disposition amongst students and parents towards these professions could have a negative influence on the relative attractiveness of the professions.

An Australian study on the IT sector, highlighting the trend away from careers in the said professions, seems to offer some support for this explanation[61]. It suggests that students are aware of the shortage of trained workers in this area and the high levels of remuneration, but appear to overlook these factors due to the perceived undesirable nature of the job.

In New Zealand the situation is similar. Information from NEMP (National Education Monitoring Programme) using student feedback data and observations confirms that here too there is a disengagement trend from students in Year 8 and through

[60] http://www.stats.govt.nz/Publications/WorkKnowledgeAndSkills/LEED-reports/eote-what-do-students-earn-after-their-tertiary-education.aspx.
[61] "*Reality Bytes"*, 2001, Victoria State Government.

secondary school away from science and technology due to the perception of these being boring and involving solitary work[62].

This view is often shared by the students' parents. Some studies suggest that New Zealand parents pay particular attention to whether their offspring's chosen career will make them happy. It seems that there is a view that a career in any of these professions is less fulfilling and satisfying.

Futureintech is focused on providing students and parents with more information on what a career in these professions can offer in order to change perceptions. The overall aim is to encourage more young people to pursue a career in one of the three areas it covers. Discussion with the programme deliverer IPENZ indicated that changing parents' attitudes towards these professions is one of the key tasks of Futureintech. It tries to raise the profile of IT, science and engineering amongst pupils and parents by demonstrating the subjects' practical side and by showing that a career in these areas can be intellectually rewarding. Apart from awakening pupils' interest, it is hoped that teachers may also discover new ways of teaching as a side benefit of the programme.

International comparison

New Zealand is not alone in trying to encourage more pupils to study these subjects. In Australia, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) operates a very similar programme to Futureintech with very similar aims. Industry professionals volunteer to go into classrooms to work with schoolchildren, either as a one-off event or on an on-going basis. In addition, more than 260,000 pupils a year visit science centres across Australia.

In France, the Mobi3 programme is aimed at lower secondary school students. It is run as a year long programme whereby students are given resources and help from industry professionals to create their own products.

Students in Norway receive practical and financial help from industry to work on a variety of science and technology projects in the classroom.

What all of these and other programmes have in common is that they try to make science-based subjects more interesting to young students by emphasising their practicality and real-life relevance.

[62] Bolstad and Hipkins, 2008, *"Seeing Yourself in Science"* New Zealand Council for Educational Research, prepared for Royal Society New Zealand.

Analysis

Impact of Futureintech

The impact of Futureintech has been analysed in two ways. First, overall enrolments in the subjects it targets are examined and then compared with overall enrolment trends both in New Zealand and abroad. Secondly, feedback, from key stakeholders such as teachers, IPENZ, NZTE and industry, is analysed. While any changes in enrolment numbers may or may not be due to the programme, we use the stakeholder feedback information to assess whether it is likely to have resulted from Futureintech. Thus, we combine the findings to assess what, if any, impact Futureintech has had.

According to figures made available to us by IPENZ, there has been a small increase in the number of students enrolled in natural and physical science courses and a significant increase in the number of people studying engineering and related technologies. However, the number enrolled in IT courses has dropped by about 19 percent (see table 21 below).

Table 21: Student Enrolments in Selected Subjects (certificate 1 – doctorates)

Field	2003	2004	2005	2006	2007	2008
Natural and physical sciences	66,925	66,105	64,614	67,381	68,593	68,374
Information Technology	63,013	60,072	55,948	53,361	49,709	50,494
Engineering and Related Technologies	49,460	54,244	61,218	62,342	69,542	65,239

A further breakdown of these figures shows that the small increase in young people obtaining qualifications in the natural and physical sciences is mainly driven by a higher number studying bachelors degrees. IT has seen a decline of about 30 percent in bachelor degree student numbers since about the time of the bursting of the dot.com bubble. Diploma 5-7 student numbers have almost halved over the same period, while student numbers for other qualification categories have remained fairly stable.

As shown in Figures 6 and 7, although the number of people studying for most of the different qualification categories in engineering steadily increased for most of the period 2001-2008, the overall increase was particularly marked in the lower qualification categories. Certificates 1-3 student numbers more than doubled to over 33,000 in 2008, while those studying for a Certificate 4 qualification almost doubled to more than 8,200. Bachelor degree student numbers barely changed, while those studying for an honours degree increased by approximately 30 percent to 11,975.

Figure 6

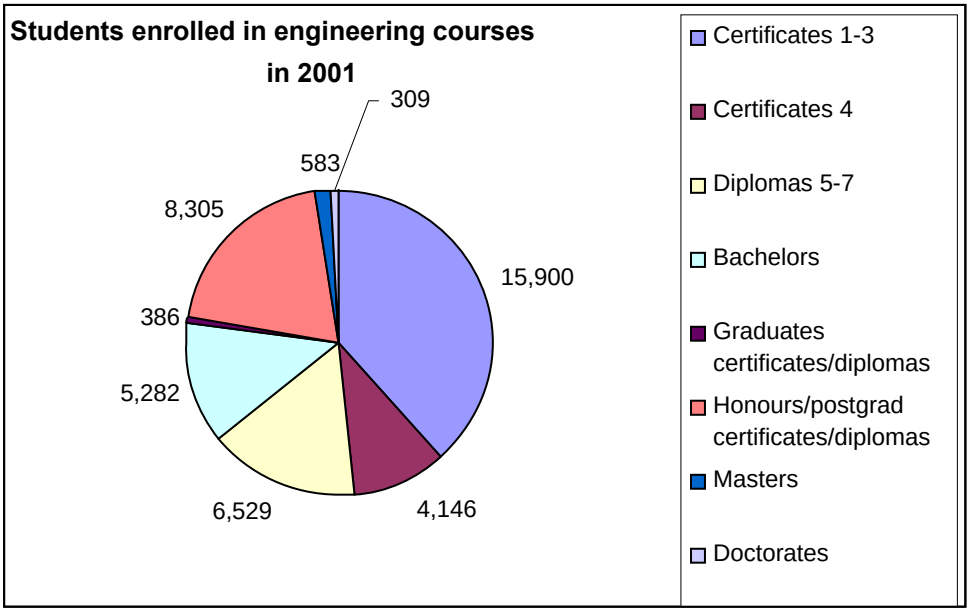
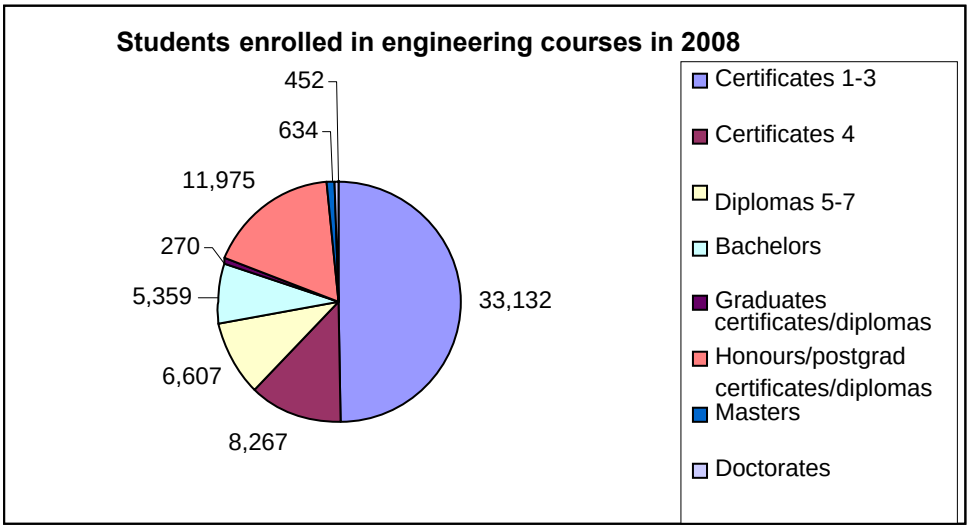


Figure 7



A comparison with other countries reveals that the proportion of students studying IT has declined in all four countries (see Table 22). Norway and Greece have experienced very similar drops to New Zealand, while in Australia the percentage drop has been smaller. The proportion of students studying engineering is smallest in New Zealand. Interestingly, the proportion of engineering students of total enrolments is nearly twice as high in Greece, a country which in wealth terms and economic composition is very similar to New Zealand. Greece also has higher proportions of natural and physical science students. These higher proportions seem to be at the expense of a smaller proportion of commerce students.

The proportion of students studying physical science and engineering increased between 2006 and 2008. Australia also experienced an increase but it was much more marginal in percentage terms than ours.

Table 22: A Comparison of Enrolment Statistics for NZ, Australia, Norway and Greece[63], Percentage

	NZ		Australia		Norway		Greece	
	2006	2008	2006	2008	2006	2008	2006	2008
Natural sciences	13.8	10.8	7.9	8.0	13.9	13.1	19.0	13.7
Physical sciences	2.1	3.0	1.9	2.0	0.97	0.99	5.2	4.3
IT	6.2	4.2	8.0	7.3	6.1	4.9	5.1	3.6
Engineering	4.2	5.3	7.0	7.2	8.1	7.2	9.0	10.1
Commerce (Econ Accy)	26.4	23.0	28.7	30.4	10.1	10.7	8.4	9.1
Law	5.0	4.2	4.7	4.5	2.1	2.8	6.9	5.3

We note that while the number of engineering students has increased in absolute and in relative terms, the number of students in natural and physical sciences has only increased very slightly. As this small increase was accompanied by an increase in the overall population of students, the proportion of students in this area as a share of the total student population has declined. IT numbers have declined, both in absolute terms and relatively. While New Zealand seems to be broadly in line with other comparable countries, the relatively smaller proportion of engineering students, especially when compared with Greece, is noteworthy.

On their own these statistics do not provide evidence for or against the success of the programme. Six years is not a long time for a programme of this kind and it is likely that any statistical information will only materialise in the coming decade or so. While it is not possible at this stage to attribute the increases in sciences and particularly engineering students to the Futureintech programme, it is likely that the programme has made some positive contribution towards this recent trend.

Some evidence for the positive influence of Futureintech comes in the form of success indicators other than enrolment numbers. Feedback from teachers suggests that Futureintech may have a positive impact on how the subjects are taught at school by showing teachers practical things they can do and demonstrating to their pupils how much fun the subjects can be. One teacher reported that the work of the ambassadors with students and company visits added 'authenticity' and 'real meaning', and that students are shown career opportunities they might not have discovered otherwise. There are cases of pupils obtaining internships or future work through the ambassadors.

IPENZ also reports strong interest by schools in Futureintech. While initially IPENZ carried out some marketing activity for the programme, this is not the case anymore. Futureintech did not target schools directly and the programme was spread by word of mouth. According to IPENZ, there is a steady stream of new enquiries which, while still manageable, is putting pressure on resources.

Retention rates of 500 ambassadors are also good. According to IPENZ, the average time an ambassador is involved with the programme is two years and when they leave it is normally for pertinent reasons such as a job transfer.

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[63] OECD http://stats.oecd.org/Index.aspx?DatasetCode=RGRADSTY.

These findings and feedback underline the popularity of the programme and show that it has some influence, at least on how the subjects are taught, and provides students with career information and experience which could have an influence on their career choices. The qualitative data discussed here may suggest that progress is being achieved. However, ultimately the programme's effectiveness will have to be measured by the impact it has on enrolment numbers. As stated above, it may take a few more years to see any real effects, if there are any, more clearly.

Funding of Futureintech

IPENZ receive $1.2 m of funding for Futureintech from NZTE. This money is used to fund the salaries of the eight facilitators, who provide the link between schools and ambassadors, and a further 2.2 FTEs at IPENZ who are involved in the administration of the programme; for maintaining the website and producing information materials such as brochures; ambassadors' travel and accommodation expenses; and a range of other minor activities, eg web support. Some brochures are part funded by professional organisations such as NZIFST.

Staff costs of around $100,000 per employee for this type of work seem reasonable, bearing in mind that these cost include overheads, too.

Although there is no marketing activity, some pamphlets are produced. Volunteer ambassadors do not get paid for their time by IPENZ, as their employers cover these costs, but they do get their travel expenses reimbursed.

Conclusion

Although there is no clear evidence of a market failure in the sense of market signals not reflecting underlying fundamentals, the programme addresses a perceived shortage of graduates and other skilled workers in the targeted professions. This is in line with similar programmes in other comparable countries.

Stakeholder feedback on the programme is encouraging but it is not possible at this stage to determine quantitatively what impact Futureintech has made. There is a view that the programme's reach could be extended by making more use of IT and by working with other industry organisations and stakeholders. NZTE have informed us that some thought has been given to this.

9.2 Lean Business

Background

Lean business is based on the philosophy and tools of the "Toyota Production System", which is aimed at improving productivity, quality and service. Lean has a culture of waste elimination and continuous improvement based on customer needs. In essence it seeks to both increase outputs and reduce inputs to achieve improved business performance.

The first programme to support the uptake of Lean concepts by New Zealand businesses was the Aichi Lean Manufacturing programme which ran between 2005 and 2008. The Aichi project was operated as a pilot to test the effectiveness of Lean

with a relatively small number of companies. NZTE concluded that this project was a success and introduced the successor programme, Lean Business in 2008.

Lean Business consists of two stages. The first stage is a two day training course for business owners and senior managers that covers the principles and benefits of Lean and stresses the importance of leadership and change management to the ongoing success of Lean within a business. The course aim is to achieve management buy-in. After completing the course companies that are committed to proceeding with Lean are eligible for stage two, which offers them up to $20,000 of co-funding from NZTE. This is offered on a 1:1 basis to engage the services of an expert trainer/consultant, over a 12 month period, to train staff and assist with the planning and implementation of Lean.

Since November 2008, 24 training courses have been held, involving 152 companies[64]. A total of 65 firms have signed up for the second stage co-funding agreements.

The funding for the Lean programme in 2008/09 was $0.6 m out of a total of $1.07 m that was spent on Lean and Manufacturing Plus (see next section). The funding for the current financial year (2009/10) for both programmes is $1.9m: the majority of which ($1.6 m) will go to funding the Lean programme. These figures do not include NZTE staff and overhead costs.

Intervention rationale

There appear to be two main reasons for government support and subsidisation of Lean Business in New Zealand. The first issue is one of information and investment in Lean by NZ business. NZTE argue that New Zealand businesses have been very slow to adopt Lean and that especially prior to 2005 few companies were familiar with the concept. While this is not necessarily a market failure, as New Zealand firms could get the information if they paid for it, the issue seems to be one where firms do not know about the benefits and therefore do not make the necessary investment to obtain the information. This may constrain their productivity and thus the ability of New Zealand firms to compete internationally.

A second rationale is that apart from the benefits Lean Business may have for the firm accessing it, there could be wider benefits if the information and concepts are passed on to business partners and suppliers, ie vertical spillover benefits. Calling this a market failure may be stretching that concept in the presence of net private (firm-specific) benefits, but it is clear that without some firms adopting Lean, these wider benefits will not be reaped. It appears that the programme is targeted at alleviating information problems and generating spillover benefits.

Objectives

The programme's ultimate aim is to improve the productivity of New Zealand businesses. The focus was initially on manufacturing firms but the programme has now been extended to include firms in the food and beverage, biotechnology and

[64] See NZTE Board paper, August 2009.

wood processing sectors. Accordingly, the programme has been re-branded as Lean Business.

Discussion with the NZTE programme manager and NZTE internal papers[65] have revealed further (informal) objectives that inform NZTE thinking. These further objectives may be summarised as follows:

- To inform and familiarise NZ firms with Lean
- To demonstrate its benefits to the wider business community
- To build a pool of Lean advisers/facilitators
- To overcome the initial investment hurdle by subsidising its implementation (as described above)
- To phase out the support once 'critical mass' has been achieved
- To align the programme with other NZTE productivity programmes such as BBD and Manufacturing Plus
- To engage 60 companies in Lean Business in 2009/10 and a total of 175-200 between 2009/10 and 2011/12.

Estimated benefit

NZTE estimate the potential benefits from Lean to be in the region of $300 m over a five year period, assuming 175-200 companies participate in the programme and their labour productivity increases by 20 percent as a result of Lean. Table 23 below shows the key benefit outcomes.

[65] See NZTE Board paper, August 2009

Table 23: The key benefit outcomes of the Lean programme

Outcome Type	Expected Outcome	Evaluation Date	Method of Measurement	Owner
Companies implement Lean	60 companies engage in Lean Business and implement Lean within their businesses	June 2010 30 November 2009	Number of companies approved for co-funding and implementing Lean Review of demand to reassess funding requirements	Company Project Owner
Increase in Productivity	Participating companies achieve increases of 20% after one year in areas where programme applied.	31 Dec 2010	Gross Margin per Employee Hour Worked	Company
Establishment of Lean Learning Networks and Sector Pilot projects	NZTE regional staff continue to support existing regional Learning Networks and facilitate the establishment of two new networks in other regions - to promote Lean uptake and learning through shared experiences Support one new sector pilot project for Lean implementation	31 Dec 2009 and 31 March 2010 31 Dec 2009	Networks established Pilot Operating	Project Owner Project Owner
New Zealand Lean Institute	Possible establishment of an organisation that can support the promotion, uptake, education and best practice standards of Lean in New Zealand.	31 Dec 2009	Decision to proceed or not proceed	Project Owner

Literature review

Literature on Lean broadly supports a number of the elements contained in NZTE's Lean Business programme. Campbell-Hunt (2001) finds that there is very little interest in the uptake of Lean amongst NZ firms. He attributes the lack of interest to the production characteristics of NZ firms such as complex production lines due to low volumes and product variation.

Failure rates of Lean vary across countries but may be more than 50 percent in some cases (Kallage, 2006). Cua et al (2006) examine Lean Manufacturing, defined as consisting of three elements: Total Quality Management (TQM), Just in Time

Production (JIP) and Total Productive Maintenance (TPM). According to their study, Lean failures are the result of partial implementation of one or more of these elements. Several studies (eg Cua et al, 2006; Kallage, 2006; and Scherrer-Rathje, 2009) highlight the importance of management and staff buy-in as a crucial ingredient for successfully implementing Lean.

Hines et al (2004) argue that many firms do not make full use of Lean by not extending it to their complete supply chain. These spillover benefits have been seen as a key feature of Lean from the beginning when Toyota passed its knowledge and practices down to their supply chain. Klier (1999) highlights the highly localised nature of these spillover benefits in the US car industry. He finds that the spillovers from Lean often lead to tight geographical linkages. It is interesting that most spillover benefits from Lean are associated with the car and other manufacturing industries.

Shapira (2003) examines government support for implementing new ways of manufacturing, including Lean. He finds that firms often cite lack of time, money and confidence in implementing new ways of doing things as obstacles. He further argues that government assistance may be justified on strategic and competitive grounds, and to support job creation and strengthening. It is noteworthy that these arguments do not adequately take into account opportunity costs and long term implications.

Other OECD countries do offer some support for implementing Lean but it varies from comparable support to general support for buying-in advisory services. In Australia government support available through Enterprise Connect offers free advice of current business processes and performance and up to $20 K of funding to implement Lean. The UK subsidised consultancy services on a 1 to 1 basis up to GBP 3,250. In Finland support for Lean is available through Tekes[66].

Analysis

Funding for the Lean programme

Total funding for the Lean programme has increased since the Aichi pilot but NZTE's own analysis shows that funding per client has actually decreased from $26 K per client for the Aichi programme to $20 K for the Lean Business programme and approximately $2,500 for the training course. According to figures cited in the Lean Business case, 1.3 NZTE FTEs are involved in the administration of Lean Business. This seems reasonable.

Although it is difficult to find benchmark comparisons, it seems that the programme is efficiently run with most of the funding going to firms to buy in external Lean expertise.

The number of firms to be engaged in the coming three years seems to be based on the amount of funding available. That may be an acceptable way of proceeding if the

[66] Tekes is a publically funded organisation in Finland, providing financing for R&D and innovation and acting as a facilitator for creating industry links.

pool of firms is large and funding does not extend to all who require the assistance but it is not clear that this is the case. If the goal is to build critical mass, one should define what that constitutes, with the funding then being tailored as much as possible to achieve it.

Impact of the Lean programme

NZTE suggested a group of five representative companies for interview. Respondents on the whole had a very positive view of Lean and appreciated the NZTE support but several firms have had to proceed with the implementation of Lean concepts more slowly as a result of the ongoing economic downturn. One respondent had not yet implemented Lean due to the recession but was certain to do so in the near future.

Most who had already implemented it, stressed the importance of the expert advice the co-funding helped to buy in. One respondent did not feel a consultant added much and would rather use the money for hiring another employee so that he could dedicate his time to Lean implementation.

Given lead times of implementing Lean of between two and three years[67], it may be too soon to analyse the full impact of Lean on recipient firms' productivity. However, most firms we spoke to have already experienced direct benefits as a result of Lean. The quantifiable benefits are mostly in the form of quicker delivery lead times, elimination of waste, and better utilisation of capital and labour (ie greater efficiency). In addition, respondents identified a number of intangible benefits such as better management-staff relations.

A couple of respondents have reduced delivery lead times by at least 50 percent, while others told us they had come down without putting a figure on them. Productivity improvements were in the region of 30-60 percent. One firm said that thanks to Lean they have not had to lay off any of its employees during the recent recession. All respondents who had implemented Lean said that it had cut their waste. Better staff engagement and management of staff relations were cited as important intangible benefits. These findings, although based on a small sample, are broadly in line with the 2008 review of Lean Manufacturing by Lincoln University.

Only one firm of the five interviewed has so far passed on their knowledge to its suppliers and even one of its customers. NZTE indicated that they are aware of other firms actively working with their suppliers to make change and expect a considerable lag before companies attempt to work with their supply chain as they need to get their workplaces sorted out first.

A further couple of firms indicated they attend Lean networking groups where they share their experience in an informal setting. All firms said that they would be willing to share their knowledge at least with their suppliers. "We should be doing more of that" was a comment that was made repeatedly. Time and not having fully implemented Lean yet were the most commonly mentioned reasons for not having done more of it. The 2008 review by Lincoln University made similar observations,

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[67] *Supporting Lean Manufacturing Initiatives in New Zealand*, Lincoln University, 2008.

concluding that integrating Lean into their supply chains was of low priority for most firms due to their focus on embedding it internally first.

In summary, the findings indicate a lack of evidence of spillovers so far, apart from one example. It is too soon to form a definite view on whether spillovers are likely to occur in the future, but the stated intentions by participant firms to share their knowledge may lead to positive impacts in others.

Additionality

All respondents felt that the training/information component of the programme was very valuable and gave them the necessary information including confidence to proceed with implementing Lean. The fact that Lean was supported by government also de-risked it for firms. In hindsight, firms would have been prepared to pay the full costs of Lean Business, especially given the direct benefits a number of them were already experiencing.

It would be misleading to assume that firms would not have made any productivity improvements or reduced delivery lead times without the NZTE Lean Business programme. Most firms we spoke to had already at least been thinking about Lean prior to their involvement in the programme. In one case at least the firm was already buying in Lean expertise when NZTE alerted them to the Lean Business programme. The firm then got on the programme in order to qualify for the public co-funding to subsidise their investment. In this instance, the Lean programme provided no additionality whatsoever as the firm would have made the Lean investment anyway. From our interviews, it appears that Lean NZTE support merely speeds up most participating firms' progress on Lean.

The counterfactual therefore should be a longer period of time over which the benefits mentioned in the previous paragraphs would have been realised without the NZTE Lean programme. This important aspect for truly assessing the impact of the public investment in Lean has not been given adequate consideration in the previous Lincoln University review or in NZTE Lean documentation such as the Lean business case. The private benefits to firms as a result of the NZTE programme may be less than the impressive productivity gains when one takes into account the counterfactual. This is in a way not too surprising given that most programme participants are NZTE key account or pipeline clients and therefore already performing at a relatively high level.

However, there might be some additionality if government intervention increases the success rate of Lean implementation. As stated above, failure rates in some countries are in excess of 50 percent. The $20K grant for implementing Lean is targeted at buying in external consultancy services which are seen as crucial for Lean to be successful. The grants may allow firms to buy in more advice than they would have otherwise have done, thereby increasing the success rate. However, this is not mentioned as an objective of the grant and we received no indication that firms would have availed themselves of insufficient advice without the grant. It appears to us that firms who invest in Lean generally had a thorough understanding of what it involves and why they are doing it.

Conclusions

The Lean Business programme has a number of features that other NZTE programmes may wish to draw on. It is supported by an intervention rationale based on information issues and perceived spillover benefits, a set of objectives, and thinking about an exit strategy. Furthermore, it has been reviewed and information on its impact on recipient firms has been collected.

The broadening of the scope of this intervention makes it appear similar to activities funded under other output classes, and does raise the question as to whether such activities should be funded under output class two.

The case for intervention is strongest for overcoming NZ firms' lack of familiarity with Lean. The information sessions, together with the ETP training component, appear to be achieving the intended outcome of providing firms with the necessary information. The fact that the information is perceived to be endorsed by government seems to have a positive influence on firms by 'de-risking' Lean.

Targeting firms that are most likely to benefit from Lean may be appropriate as long as those firms would not implement Lean in any case. The additionality of the programme, and therefore the effectiveness of the intervention, is much reduced if investments firms would have made anyway are subsidised or merely speeded up. This might be an indication of the intervention going beyond its optimal level.

There is some anecdotal evidence that the current economic climate might prevent some firms from making the necessary investment to implement Lean without the NZTE subsidy. If finance is an issue and the $20 K subsidy is to help overcome it, there is a case for increasing value for money for the taxpayer by giving the money as a loan rather than as a grant. However, value for money considerations would also need to take into account the costs of administering a loan scheme. As recognised by firms who have been on the programme, the benefits from Lean are for the most part private, ie they are enjoyed by firms directly. In the absence of wider benefits it is unclear why the taxpayer should subsidise the adoption of new practices by some firms.

NZTE thinking about an exit strategy is very encouraging and highly commendable. In this context, recent statements about expanding Lean and better aligning it with Better By Design and Manufacturing Plus seem contradictory. If the aim is to increase uptake in the short term to achieve critical mass and to then exit, there is a greater need for clear objectives and success criteria to clarify at what point NZTE will exit the programme.

9.3 Manufacturing Plus

Introduction

Manufacturing Plus focuses on firms developing a clear business strategy aimed at enhancing value creation. Firms are required to evaluate their business, looking at their vision and value proposition, identifying their strengths and weaknesses, and developing action plans to achieve business goals. The Manufacturing Plus

programme is designed to develop management and leadership, and to increase profitability and exports.

Manufacturing Plus has evolved over time. It was based on research work conducted by the Manufacturing sector 'Vision Group' in 2006. The Vision Group, representing key stakeholders in the manufacturing sector, developed a framework to help transform the manufacturing sector to world class performance. This identified best practice behaviours and key success factors from New Zealand's most successful manufacturers and exporters. Manufacturing Plus is delivered through workshops for individual businesses and a self-help 'Value creation' book has been published as a resource for companies.

An industry expert has been involved in the Manufacturing Plus programme since the initial sector workshops. His expertise in this area is extensive as he has his own private consultancy. In running the training events Professor Pratt also includes Peak Performance (PPO) his own techniques with Manufacturing Plus in the workshops.

The structure of Manufacturing Plus consists of two workshops 'Purpose and Practice' which are planned to be run close together. The first 'Purpose' workshop is fully funded by NZTE to the value of $4,000. The further one or two 'Practices' workshops are funded on a 1:1 basis, with the firm and NZTE paying $2,000 each. Additional sessions can be undertaken by the firm at their own expense ($4,000). The purpose session covers a review of the company mission and value proposition, and the practices workshops assist firms to identify key business challenges and develop objectives and action plans to achieve these challenges.

Funding

The funding for the programme is approximately $300 K per annum. This pays for the industry expert's costs, some overheads and marketing.

Objectives

The objectives of the programme are to get firms to refine their business plan and to set more challenging growth targets, where appropriate.

Effectiveness

Without a counterfactual it is impossible to quantify the success of Manufacturing Plus. Interviews with firms have identified the benefits firms have had from the programme. Firms have reviewed and refined their business practices, changed the focus of production towards new products or altered their business model. This has lead to significant gains in business. However, it is difficult to quantify these gains.

Firms provided examples where they had changed or refined their business practices or business goals. Many commented on the high level of investment required to undertake the Manufacturing Plus programme both monetarily and particularly in terms of time, and that the support NZTE provided was very beneficial. Many highlighted the expertise of the industry expert, indicating that they are willing to hire him privately without NZTE funding.

Conclusion

Although most respondents were full of praise for the industry expert and listed a number of impacts the programme has had on their business plans and growth targets, in line with Manufacturing Plus's objectives, these benefits have been exclusively private. There appears to be no scope for wider benefits to the sector. Although firms are willing to share their success stories, there appears to be limited spillover benefits to the sector from implementing Manufacturing Plus.

9.4 Better By Design

Programme description and background

Better by Design (BBD) is a programme in its own right. Having been established in 2004 as an outcome of the Design Taskforce, it has become one of NZTE's flagship programmes. It has high visibility and is supported by influential New Zealand decision makers. Since 2003/04 BBD has received a total of $21.455 m in government funding[68]. It will continue to receive approximately $4 m per annum in the coming years.

BBD's key tool is the Design Integration Programme. It is a comprehensive programme of business assistance delivered in a number of stages using purpose specific methodology. Participants are chosen on the basis of their fit with the eight programme criteria which measure both their opportunity and commitment to become leading global companies. The threshold for programme participation is annual revenues of at least NZ$20 m.

Objectives

The programme's aim is to '*inspire New Zealand's best companies to success by design*[69]' in order to improve firms' export performance and ultimately to increase New Zealand's export earnings. To achieve these goals, BBD has concrete interim objectives. Until recently these could best be summed up as 5 x 50 x 500 x 5. That is, in the first 5 years to make 50 existing businesses internationally competitive, generating an additional $500 m per year in export revenue and growing at a rate of 5 times targeted GDP.

Following a review of the BBD programme by NZTE, these targets have recently been revised. From 2009/10 on BBD's goals over the next five years are to produce: '*10 global design leaders, 25 mature design integrated companies and 100 companies growing exponentially through design and collectively delivering $1 bn per annum in additional foreign exchange earnings*'.

Intervention Rationale

The need for public intervention is attributed to a lack of understanding amongst firms of valuing design aspects in their operations and an underdeveloped design sector. Essentially, because they are unaware of the benefits firms do not invest enough in

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[68] *Review of Better by Design Programme of Initiatives,* LECG, 2008.
[69] *Ibid.*

design aspects and as a result do not do as well as they could. This prevents the design sector from reaching its optimal size. By informing firms of the value design aspects can bring to their businesses and stimulating demand for design aspects, public intervention aims to overcome these problems. (See Appendix 4 for the Better by Design Intervention Logic diagram).

Participation

Every year around 20 firms enter BBD's main programme, the Design Integration Programme. The programme assesses how a business integrates design aspects in its products, processes and culture to stimulate innovation. The assessment culminates in a firm specific project plan, with further help available for implementing its recommendations. According to the BBD website[70], the project plan may include:

- Revising a company's mission, and long term strategic plan
- Improving manufacturing processes, and market distribution strategies
- Improving the structure of R&D and product development processes
- Reworking employee structures, to incorporate design-led positions and integration between functional teams
- Developing new branding and communication strategies.

Other activities offered by BBD include executive education courses, conferences and workshops.

Previous Reviews

The most recent review by consultants LECG in 2008 is qualitative and descriptive in nature. It draws on previous reports prepared by TNS Conversa and others, a small number of interviews with key BBD staff and six participating firms. In line with the previous reports and feedback received by NZTE, it concludes that overall BBD is a useful programme that is likely to lead to firm specific improvements and that it is achieving its main objectives in terms of extra export revenue earned and growth in exports of 5 x GDP. Furthermore, the review finds that BBD clients have higher turnover growth than the average (47 percent compared with the national average of 7 percent) and that the programme meets its intermediate targets (see logic diagram in Appendix 4). That is, companies are displaying[71]:

- A higher level of understanding of customers and their needs and desires.
- An increased awareness of the role of design in strategic and operational processes
- Product and services changes, including look, feel and usability
- Branding improvements

[70] See http://www.betterbydesign.org.nz/about-better-by-design.
[71] Review of Better by Design…', pg 2, LECG, 2008.

- Distribution changes to link more directly with customers
- Increased investment in design.

In spite of these positive findings, LECG stress that BBD entry requirements mean that participating firms already perform very well, and that their analysis does not establish any further quantitative impact from BBD assistance.

Analysis

As the findings of the review by LECG in 2008 should still hold, we do not seek to redo that analysis. Rather, our focus was on conducting a quantitative analysis to establish the impact BBD has on firms' performance. To this end we make use of the prototype Longitudinal Business Database (LBD). The LBD contains wide coverage business related data for financial years 2000 to 2007, for all economically significant firms in the New Zealand economy[72]. See Appendix 5 for a detailed description of the econometric analysis of the impact of the BBD programme.

Conclusion

There is no conclusive evidence of significant short term impact from BBD for two of the three groups specified in the analysis[73]. The marginal impact of BBD is not so large that it can be clearly seen one or two years following participation in the programme. Firms that have received other NZTE support but no assistance from the Foundation for Research, Science and Technology (FRST) may benefit more from BBD in the short term, although the sample size is very small.

These rather negative results seem surprising, especially given the positive assessments made by previous reviews. There appears to be ample anecdotal information to suggest that BBD has a real impact on firms that leads to changes at various levels of their operations. The feeling among many programme recipients is that these changes are affecting the business in a beneficial way. So, why is it that our econometric analysis does not corroborate this?

One possible explanation is that not enough time has passed for the changes that businesses have made to their operations to translate into the available data. Two years of outcome data also limits the number of observations. It might be that as more outcome data becomes available, a more positive impact of BBD can be seen in the data.

The fact that so many BBD firms also receive other types of government assistance makes our analysis particularly difficult. We have overcome this issue by separating the firms into various groups and sought to measure the additional impact due to

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[72] Fabling, R. (2009), 'A rough guide to New Zealand's Longitudinal Business Database', Paper prepared for the *Comparative Analysis of Enterprise Data Conference,* Tokyo, December, 2009.
[73] *Group 1* comprised BBD firms that have received both previous Technology New Zealand assistance from the Foundation for Research, Science and Technology (FRST) and previous services or grants from NZTE assistance (other than BBD). *Group 2* comprised BBD firms that have received previous other NZTE assistance but no assistance from FRST. *Group 3* was a subset of Group 1 and comprised BBD firms that have received assistance from FRST and are client managed by NZTE.

BBD alone. However, this ignores the impact of other types of assistance, such as the client management services from NZTE which may be positive.

Whilst one should not ignore these results, it is too early to draw any strong conclusions from the econometric analysis. As more data becomes available and as time passes, an update of our results could lead to very different findings. Our results underline the need for further quantitative analysis into the impact of BBD on participating firms. NZTE's recent investment in this line of work by working with consultants is entirely appropriate and shows that programme managers are aware of the need for this type of analysis[74].

9.5 America's Cup leveraging programme

Background

Government entered into agreements with Emirates Team New Zealand (ETNZ) via The New Zealand Way Limited to provide funding of $30 million to support the campaign for America's Cup 2007 held in Valencia, Spain. There was an expectation from Government reflected in the sponsorship agreement, that Tourism New Zealand (TNZ) and NZTE would develop and implement plans to leverage potential tourism, trade and investment benefits. In December 2005 the Board approved $2.5 m for the America's Cup Leveraging Programme, a project spanning three financial years.

NZTE had the opportunity to leverage the exposure and attention across Europe, which ETNZ generated for New Zealand during the running of the 32nd America's Cup, furthering a number of NZTE strategic goals. NZTE surveys across a wide cross-section of senior business executives in Europe confirmed that the Cup would attract a keen following from many corporate leaders and decision-makers throughout Europe (who were already being hosted by sponsors of the syndicates). The benefits of this opportunity were also based on the understanding that media coverage would be extensive; and following leadership of several other sponsors who were already well advanced in implementing their sponsorship programmes.

The leveraging programme comprised three main strands of activity, based around the ETNZ hospitality centre at its base in Valencia. The hosting model was centred around hospitality and tours on the base as well as on the water viewing on an ETNZ spectator boat.

Intervention logic and objectives

The Terms of Reference for the America's Cup leveraging programme state the objectives as "utilising [the platform created by Team New Zealand's challenge for the America's Cup in Valencia] to:

- "Develop and deepen strategic relationships in furtherance of [NZTE's] strategic goals".

[74] NZTE has commissioned independent research on BBD, based on 2009 financial data and qualitative interviews, the results of which should be available in August 2010.

- "Achieve enhanced exposure Brand New Zealand objectives".
- "Ultimately to drive increased foreign exchange earnings across the key sectors involved".

The New Zealand Government's $30 m funding of Emirates Team New Zealand created opportunities for the Government, through NZTE, to provide hosting, PR and communications, and sector specific showcase and networking events attached to the America's Cup. These opportunities were only available to sponsors of ETNZ, including the Government and corporate sponsors.

The leveraging programme can be seen as a necessary accompaniment to the Government's direct funding of ETNZ in an attempt to raise the public value extracted from it. Its scope is too broad ranging across sectors and types of firms to be targeted at specific market failures. A number of the activities under the programme link into other NZTE sector assistance programmes, particularly those related to the marine industry and the Better by Design programme. It is possible that the America's Cup leveraging programme could have assisted with addressing any market failure issues in those areas, although this cannot be ascertained from available reporting.

Spillover benefits are possible from the programme given its focus on creating awareness of the New Zealand brand and certain New Zealand industries. For some firms productivity enhancing transactions could arise from the programme that would not otherwise have occurred and these result in additional growth for the economy as a whole. However, these potential benefits are not articulated in the available NZTE documentation related to the programme and the activities under the programme do not appear to link to a spillover rationale.

Alignment of activities with objectives

The activities under the America's Cup leveraging programme appeared to have made good use of the opportunity to showcase selected New Zealand industries and foster corporate networking and relationship building. It appears that the hosting facilities and events presented a professional and positive image of New Zealand and that the commercial opportunities were well taken by corporate participants. To this extent, the activities seemed to be well aligned with the specific objectives of developing and deepening strategic relationships, and achieving enhanced exposure of Brand New Zealand objectives.

America's Cup leveraging programme activities were geared towards making connections with potential overseas buyers and supply chain partners. On the face of it, therefore, activities were aligned with the ultimate objective of driving increased foreign exchange earnings across the key sectors involved. From NZTE reporting on the activities it appears that many of the corporate engagements were with existing customers and suppliers or contacts made previously. There may be a question about the extent to which a greater number of new contacts could have been attracted to and engaged at the events, which may have had greater potential pay-offs in terms of new foreign exchange earnings.

Benefits

NZTE reported to the Ministers of Trade and Economic Development in April 2008 that the America's Cup leveraging programme resulted in business under discussion of $128.7 m and confirmed orders of $99.7 m as at April 2008. Confirmed sales for the marine industry exceeded NZTE's target of $35 m.

Table 24: Estimate of benefits from America's Cup leveraging programme

Estimate of Benefits from America's Cup Leveraging Programme			
	Existing relationships	New relationships	New and existing relationships
Business signed	$ 99,345,000	$ 310,000	$ 99,655,000
Business under negotiation	$ 48,520,000	$ 80,200,000	$ 128,720,000
Total business signed and under negotiation	$ 147,865,000	$ 80,510,000	$ 228,375,000

Of the $99.7 m confirmed orders emerging from the programme, $80 m was attributed to two large super yacht orders. In addition, as shown in Table 24, the overwhelming majority of confirmed orders were from existing relationships. This raises a question about the extent to which the Valencia meetings facilitated by the leveraging programme actually contributed to the deals taking place. It seems reasonable to assume that there were high probabilities of larger deals with overseas parties with which New Zealand companies already had solid relationships being signed regardless of the America's Cup leveraging programme.

New relationships possibly accounted for $80.2 m[75] of the $128.7 m of new business under negotiation emerging from the leveraging programme. However, $57 m of this was for two large potential super yacht deals with one company and $22 m was quotes for the supply of spars and rigging from another company.

It would appear that the hospitality centre in Valencia provided attractive facilities for New Zealand companies to network and negotiate with potential customers and supply chain partners. In this regard, it no doubt allowed a professional and competent image to be projected. It was also a convenient European meeting point because of the interest in the America's Cup from European company executives and marine industry operators. However, it does not seem plausible that these factors were critical 'deal makers' in most instances given the size of many of the deals and the extent of the relationships that already existed between parties.

It is not possible from the information available for this evaluation to assess the benefits that might have resulted from the themed events at the TNZ base in Valencia. The events would no doubt have raised New Zealand brand awareness, and this would likely have flowed on to heightened awareness of the participating industries. Two owners of marine industry firms reported in interviews that events

[75] Where it is unclear from NZTE reporting whether there has been an existing relationship between New Zealand companies and overseas parties, the potential business has been classified as being the result of new relationships. So, it is possible that these potential deals actually emerged from existing contacts.

such as the America's Cup and exhibition events are very important in terms of raising overseas awareness of the New Zealand brand and the marine industry more specifically. Some of the potential deals emerging from new relationships established in Valencia may have been the result of the themed event programme.

Similarly, the PR and communications programme at Valencia would also have raised awareness of New Zealand industries, but again, this cannot be quantified.

It is not possible from the available information to ascertain the wider economic benefits from the America's Cup leveraging programme. Given that the leveraging programme was not targeting clearly defined market failures or spillovers, and given that it is possible that many of the larger deals signed in Valencia would have been signed anyway, there is a case for concluding that there are unlikely to have been overall net economic benefits

Conclusion

The objectives of NZTE's America's Cup leveraging programme were focused on commercial relationship development, enhancing the NZ brand, and driving increased foreign exchange earnings. It is difficult to conceive genuine market failure reasons for the America's Cup leveraging programme. Its scope is too broad ranging across sectors and types of firms to be targeted at specific market failures.

The activities under the America's Cup leveraging programme appeared to have made good use of the opportunity to showcase selected New Zealand industries and foster corporate networking and relationship building. However, there might be a question about the extent to which the focus was on creating new contacts and relationships, as opposed to cementing existing relationships and finalising deals that were already under negotiation.

NZTE report confirmed orders of around $100 m resulting from NZ firm exposure in Valencia, although $80 m of this amount was for two super yachts from one company. Around $129 m of business was under discussion arising from contacts as part of the leveraging programme. It is unclear the extent to which these deals and potential would not have emerged if the opportunities in Valencia were not available. However, it does not seem plausible that the leveraging programme was critical to larger deals going ahead, especially when there was an existing relationship between the parties. There are likely to have been benefits to participating industries from the opportunities to further enhance the New Zealand brand in Valencia. This has been mentioned as important in the marine industry and is likely to be the case for other industries.

It is not possible from the available information to ascertain the wider economic benefits or spillovers from the America's Cup leveraging programme. Given that the leveraging programme was not targeting clearly defined market failures or spillovers, and given that it is possible that many of the larger deals signed in Valencia would have been signed anyway, there is a case for concluding that there are unlikely to have been overall net economic benefits.

9.6 Food and beverage sector activities

Our approach

We have focused less of our evaluative effort on examining food and beverage sector activities in detail in this evaluation. This is due to the occurrence of evaluation themes that are very similar to those reported at length in this report, and our intention to limit repetitive detail. We also consider that there has been substantive reporting, including evaluation reporting, to Ministers on food and beverage activities in recent years.

However, we note the substantial on-going investment in food and beverage activities across government, the extensive range of activities undertaken by NZTE in this area, and the potential growth for New Zealand. We recommend that the full range of food and beverage activities, both across government and across NZTE, should be evaluated as part of a separate piece of work, due to the extent of government investment and activity in this area.

We report our main findings here, and note the need for future evaluations to undertake more comprehensive evaluative work across the broad and extensive range of activities under the Food and Beverage Taskforce and NZTE's sector projects. Future evaluation of food and beverage activities should also examine the extent to which activities have incorporated the findings and recommendations made here.

Background and objectives

The F&B Taskforce programme of work, managed by NZTE, is one of six initiatives identified in the government's response to the recommendations of the Food and Beverage Taskforce. The main focus of the programme of work is to increase the profile of New Zealand food and beverage firms internationally through expanded in-market assistance.

Cabinet mandated NZTE to deliver the food and beverage programme, and allocated $19 million over 4 years since July 2007 with $4 million in outyears. The programme comprises projects which deliver:

- Platforms for New Zealand firm engagement in key markets, mainly through trade shows, including a raised profile amongst trade and consumers of the New Zealand food and beverage brand.

- Funding support to enable industry-led market development initiatives to occur, to assist a level of scale that seeds transformation (including 4 in-market assistance projects).

A significant amount of money has been invested in activities arising from the Food and Beverage Taskforce, across government agencies including NZTE, the Foundation for Research, Science and Technology, and the Department of Labour. Activities in this area arose from taskforce work and subsequent policy analysis with which MED was involved and has subsequently co-ordinated.

Intervention logic and rationale

As we note for other Output Class 2 activities discussed in this report, the intervention rationales for food and beverage sector projects could be strengthened to more clearly demonstrate the market failures that the activities are intended to address. Reports seen refer to a number of barriers that the sector faces, but do not discern whether these are the consequences of natural barriers within well functioning markets or a product of particular market failures or externalities. The activities appear to be focused on how government can assist firms to overcome barriers to growth, rather than clearly articulated reasons why government should intervene in a market failure.

Alignment of activities with objectives

Activities are in line with Government objectives to raise international profile in this area, and as noted above have been part of a cross-government approach to do so. Food and beverage activities are not just focused on sector development, but also on helping firms to internationalise and grow. While it was always expected that activities as part of the taskforce response were not just focused on sector development, but a combination of this and market access for firms, food and beverage activities have been placed within OC2. There appear to be some difficulties with categorisation, given that the main intention of OC2 activities is for activities that deliver wider benefits to sectors in ways discussed earlier in this report.

A substantial part of the Food and Beverage Taskforce consists of supporting industry representation at international trade shows. As we note for other activities within Output Class 2, it is not clear that trade shows bring about the optimum possible benefits to the sector, compared to other types of possible sector activities.

Benefits

The Taskforce consists of in-market assistance projects to different sub-sectors of the food and beverage sector, that focus on assisting industry organisations to develop and implement market development strategies. The sub-sectors are:

- Aquaculture
- Horticulture
- Meat
- Wine

A significant part of NZTE's involvement in food and beverage activities has been through the work of industry bodies. As we note for other activities within Output Class 2, support to industry organisations is more likely to bring about sector benefits, and we consider NZTE to have been successful at these types of activities.

The boxes below outline NZTE's analysis of impact for the Food and Beverage taskforce projects.

IMPACT

TRADE FAIRS

NZTE have provided examples of impact outcomes:

Internationalisation: commercial in confidence examples of internationalisation available

Market penetration: commercial in confidence examples available of impact

- Companies have improved their skills at running their own promotional events at the shows to further develop relationships and to convert leads to deals.
- Companies taking a more strategic approach to how they run their stands at a trade show and a long term approach to exhibiting and demonstrating commitment to a market.
- Collaborative platforms established with complementary firms.

Source: NZTE collated fact sheet

IMPACT	2008/09	2007/08	Info Source
Deals:	19	13	Tradeshow only
Number (only if evidence based)	$13.6m	$11.5m	Foodex 09 3-month follow-up survey
Value (only if evidence based)			FHC 08 3-month follow-up survey
			FHC07 6 month follow-up survey
			Foodex 2008 6 month follow-up survey
			NRA 08 9 month follow-up survey
Publications	EAV$228,832	EAV$133,604	NZTE daily media clips and offshore post-show PR reports
Food and Hotel China – 96 media clips	EAV$91,658	EAV$774,032	
FOODEX Japan media clips – 24 media clips			
National Restaurant Assoc Show - 5 media clips			
F&B Taskforce – 58 onshore media clips			

Source: NZTE collated fact sheet

IMPACT

In Market Assistance Projects

The In-Market Assistance Projects (projects 2 to 5 of five steams of activity) are industry driven projects and accordingly NZTE is not currently able to quantify the impact of this funding. The in-market initiatives for each industry are of considerable scale and have significant focus on developing new markets and/or new products. Details of each in-market initiative are as follows:

Aquaculture

The Aquaculture sector is an identified development priority for the Government. The industry goal is to reach NZ$1 billion annual sales by 2025. A key factor in achieving $1 billion sales is to develop the international market for New Zealand Aquaculture products.

$6.5 million (over four years) has been allocated to Aquaculture New Zealand (AQNZ) to develop and implement a market development strategy on behalf of the aquaculture industry.

2007-08

In 2007-08 (the first year funding), AQNZ produced a market development strategy. The purpose of the strategy is to guide the marketing initiatives for the sector over the medium to long-term. The strategy was launched at the Aquaculture conference on 24 July 2008. The Strategy achieved unanimous support both at the 'sign off' phase with the Marketing Steering Group representing approximately 80% of the sector and within the consultation phase to the wider sector. A summary of the 2007-08 market development activities is contained in the 2007-08 AQNZ Annual CEO report.

2008-09

In 2008-09, AQNZ produced a tactical plan for the first year of market development activities. A summary of the market development activities and context to the sector's progress in the pursuit of becoming a billion dollar industry is set out in the 2008-09 AQNZ Annual CEO report. In this report, the CEO report highlighted that 2008 was a record-breaking export year for the aquaculture sector with export sales of $265 million. 2008 also saw increased consolidation and significant growth in our leading Aquaculture companies.

NZTE and AQNZ also established the AQNZ Contestable Fund as a deliverable of the 2008/09 market development activities. Nine applications resulted in the allocation of a total of $600,000 to five projects put up by four companies. The fund is administered by NZTE. Further commentary on the Fund can be found in the NZTE Media Release: Boost for New Zealand Aquaculture companies and Aquaculture New Zealand Contestable Fund story for Shine, February 2009 issue – Business and Enterprise Development section.

2009-10

AQNZ have developed a tactical plan for implementation in 2009/10. A summary of the planned activities are set out in the 2009/10 business case.

Horticulture

$1.8 million (over two years) has been allocated to the Horticulture industry to help the industry achieve their vision of $10 billion per annum of combined export and local sales by 2020.

2008-09

The first year of funding was used to prepare the Horticulture New Zealand's industry-wide strategy, "Growing a New Future" which was launched at the Horticulture New Zealand Conference on 22 July 2009. The strategy outlines key drivers that will accelerate the industry's growth over the next decade, from an annual turnover of almost NZ$5 billion in 2008 to a target of NZ$10 billion by 2020. The strategy was developed in consultation with growers, exporters, processors and research organisations. The strategy emphasises industry growth must be export-led and that growers need to work collaboratively to achieve the kind of scale required to build international competitiveness in key markets. By the end of 2009 Horticulture New Zealand, with support from NZTE and funding assistance through the Food and Beverage Taskforce, will identify suitable product groups for two projects that demonstrate the principles of the strategy. Further commentary can be found in the draft ministerial announcement release "New strategy targets future growth for horticulture industry", and *Insight*, week commencing 27 July 2009: New strategy targets future growth for horticulture industry.

Meat

2008-09

The first year of funding was used on a development project for the premium red meat marketing in China. The project brings together three of New Zealand's largest meat processors (Silver Fern Farms, Alliance Group and ANZCO Foods) and an industry peak organisation (Meat & Wool New Zealand). The project will help these New Zealand red meat exporters understand the size and requirements of the high-value, super premium red meat market in China. In 2008 New Zealand's meat exports to China were worth NZ$96 million. The ultimate goal is to achieve additional exports to this market of up to 10,000 tonnes per annum within the next 10 years. The activity will contribute to the wider goals of the strategic vision recently developed by Meat and Wool New Zealand.

Further commentary can be found in *Insight,* Monday, 9 February 2009: Project boost for China red meat market.

Wine

$1.35 million (over three years) has been allocated to the Wine Industry to establish a New Zealand category at the top tier of US wine consumption. The project aims to develop a model that will increase sales revenue, margin and productivity for New Zealand wines in the US market. The project aims to address this issue by working with a selection of wineries to enhance New Zealand's profile (and achieve $50m in additional sales) at the top end of the market over 5 years. Total funding = $1.35 million over three years.

2008-09

The first year of funding ($150k) was used by a project steering group comprising key wine industry CEOs to undertake a comprehensive market research brief that in turn led to an implementation plan for developing the New Zealand top end category in the US. The steering group subsequently developed an operational model, budget and participant criteria which was presented as a business case to NZTE seeking the release of the balance of funding $1.2 million.

2009 -10

The NZTE Board approved the business case in October 2009 and implementation of the project plan (through to March 2012) has commenced. Participant wineries (24 in total) have been selected from a total 37 applications to the project. Selection was via an independent panel which included tasting of wines nominated to be profiled in project activity.

Source: NZTE collated fact sheet

Delivery	2008/09	2007/08	Info Source
External providers (orgs we fund to deliver services on our behalf): EAT Consultants (provider in Tokyo) Aquaculture New Zealand (AQNZ), Horticulture NZ, Meat & Wool NZ, New Zealand Winegrowers (USA) Limited	N/A N/A	N/A N/A	
WHO / REACH (Note that we can only comment accurately on the trade show work and not the in-market assistance projects which deal at an industry level.)	33	38	Trade shows only

Source: NZTE collated fact sheet

NZTE also delivers Food and Beverage Sector Projects under its sector projects within Output Class 2. There is overlap between these activities and NZTE's F & B Taskforce activities, and the distinction between these two different streams of work is not clear. Furthermore, some of the firms engaged in NZTE's Primary Sector SI are food and beverage firms, and are engaged in a number of the different activities operated by NZTE in this sector. The distinction between these three streams of work has not been clearly defined by NZTE. NZTE should align these pieces of work to determine the reasons for government intervention in this area.

Our interviews with firms, as part of the Primary Sector SI, who had also engaged in NZTE's Food and Beverage Taskforce activities, found that firms receive significant private benefits as a result of the activities. The wider benefits to the sector are not yet significantly evident, and these findings mirror our findings discussed earlier in this report on the Primary Sector SI.

Conclusions

Our comments on NZTE's food and beverage activities are broadly consistent with other findings in this report.

There appear to be issues around the categorisation of food and beverage Taskforce activities within Output Class 2. Food and beverage activities are not just focused on sector development, but also on helping firms to internationalise and grow. While it was always expected that activities as part of the taskforce response were not just focused on sector development, but a combination of this and market access for firms, food and beverage activities have been placed within OC2. There appear to be some difficulties with categorisation, given that the main intention of OC2 activities is for activities that deliver wider benefits to sectors in ways discussed earlier in this report.

The current evaluation has not undertaken sufficient work to reach unequivocal conclusions on investment in the food and beverage sector. Given the extent of investment and activity in this area, historically and on-going as part of the government's economic growth agenda, we suggest a separate evaluation of food and beverage sector activities both across the range of NZTE's activities and across government.

10. Summary and Conclusions

This chapter summarises the main findings and conclusions, as well as key recommendations arising from this evaluation.

10.1 Key findings and conclusions

NZTE has achieved some valuable sector outputs through its Output Class 2 activities

NZTE's focus on selected sectors is in line with the priority areas identified by government. NZTE has done considerable work to identify and support the growth potential in these areas. While there have been a number of changes in sector policy over recent years, NZTE has mainly adapted well to accommodate these changes in focus.

OC2 activities are generally expected to benefit sectors or linkages between sectors. This may be achieved by working with groups of firms to achieve wider spillover benefits in addition to private, firm-specific benefits, and to address factors such as information and coordination failures.

Some of NZTE's thinking reflected in board papers refers to these wider benefits. For example, original board papers for the Primary Sector Strategic Initiative focus on the spillovers expected from each individual activity. They refer to expected primary sector benefits that are consistent with OC2 aims, such as collaborations among firms, new business models and new ways of working, and exemplar firms passing knowledge on to the sector. Table 25 shows an example from NZTE's 2007 board paper. Further thinking and analysis of the spillovers for activities across the output class, and whether these have occurred, would be beneficial.

Table 25: NZTE's analysis of expected spillovers from the Primary Sector SI

Workstream	Spillover
China Retail Channel Development	Creating of exemplar companies to provide role models for NZ companies looking to enter "difficult" markets
	Validation of the "store within a store" concept as a platform for marketing New Zealand products in a retail environment
	Increased NZ brand awareness among Chinese consumers (leverages off work currently underway by Air New Zealand and Tourism NZ), supported by the development of influencer networks
Farmgate 2	Technology, knowledge and best practice transfer within the agritech industry
	New Zealand recognised globally as an originator of innovative and effective agricultural technologies
North America Channel Development	Creation of exemplar companies with respect to internationalisation and engagement in global value chains
	Enhancement of the New Zealand brand among high discretionary income

Workstream	Spillover
	US, Canadian and Mexican consumers
Shanghai Wood Innovation Centre	Development of a cohesive group of wood processing companies demonstrating the benefits of collaborative work
	Positioning of New Zealand as a world-class supplier of value-added wood products to Chinese manufacturers
	Demonstrated success of New Zealand companies working together in a market to showcase New Zealand products and innovation
Shangri-La Leveraging	Shift in NZ companies' perception of the importance of developing and maintaining strategic business partnerships
	Increased awareness of the New Zealand brand in South East Asian markets
	Opportunity to leverage strategic relationship with Shangri-La SEA into other regions
South America Food Value Chain	Spillover into other sectors (eg Education) as complementary programmes are developed
	Change in business mindset towards use of new and innovative business models as a tool for internationalisation
	Raised awareness in South America of business capability of NZ companies
Functional Foods	Validation of a model for commercialisation of innovation, involving collaboration between companies, multiple government agencies, research providers and industry experts
	Creation of exemplar companies who have demonstrated that it is possible to create commercial value from functional foods
	Positioning of NZ food and research companies as globally competitive in development of scientifically validated functional foods

Source: NZTE board paper 2007

There are examples in Output Class 2 of more thorough ex-ante thinking about the problem to be addressed, including the role of government, objectives, and exit strategies. For example, discussion with the Lean Business programme manager revealed a thorough acknowledgement by NZTE that the core obstacle to more NZ firms adopting Lean concepts was a lack of information. Lean information and training courses, either in OC2 or as part of the Enterprise Training Programme, are specifically aimed at addressing this problem. The availability of a $20,000 grant per firm for implementing Lean is intended to lead to market demonstration effects. Although no clear success metrics exist to determine when critical mass is reached, NZTE indicated that the implementation grant for Lean would discontinue once this demonstration effect was achieved.

The Better by Design programme has been informed by clear objectives to support its ultimate goal of increasing NZ export revenues[76]. Currently (2009/10) they are to produce:

- 10 global design leaders
- 25 mature design integrated companies
- 100 companies growing exponentially through design and collectively delivering. $1 bn per annum in additional foreign exchange earnings.

These objectives help focus the intervention and allow BBD to be measured against specific targets.

Some of NZTE's sector activities have led to valuable sector outputs. We found an example of NZTE facilitating firms to operate under new business models in new markets in conjunction with other smaller New Zealand firms (see Box 11).

Box 11: Company C has changed its business model in the South American market

Company C has strengthened its interests in the South American market with assistance from NZTE's South American Food Value Chain and Pastoral Farming Systems activities. NZTE assisted Company C to enter this new market, with logistical support and introductions to business contacts. The company's main focus has been to set up operations in Chile, making significant investments in staff and warehousing. Entry to this market has seen Company C use a different business model by becoming their own distributor. Their operations have extended as they have become agents for other New Zealand firms in that market, creating wider benefits to the sector.

We also found examples of NZTE facilitating collaborations among firms. Box 12 shows an example of NZTE helping 3 firms to collaborate over their entry into the North American market.

Box 12: Three New Zealand firms to access the United States

Three NZ food companies have collaborated to gain access to a large US distribution network. The three companies spent more than a year developing a deal with a major US retailer which has 270 stores in the US and Canada. The deal was brokered with the assistance of NZTE, who suggested the project to eight different New Zealand companies. NZTE have financially supported the deal in the initial stages, but will exit after 12 months. The firms will continue the arrangement in a number of different regions of the US.

NZTE has done significant work to provide leadership support to sectors through assisting industry bodies to develop sector strategies in collaboration with firms. In some cases industry bodies have facilitated collaborations among firms and increased the international profile of New Zealand businesses. For example, NZTE has worked with an industry body under the Health SI, to develop an international focus in the organisation, shown in Box 13.

[76] Until this year they were: to make 50 existing businesses internationally competitive, generating an additional $500m per year in export revenue, and growing at a rate of 5 times targeted GDP in the first 5 years.

Box 13: NZTE's work with an industry body under the Health SI

The Health SI team has been working closely with an industry body in the health sector. In the past the industry body has mainly been domestically focused. NZTE has worked with the industry body to increase their international connections, and they have been a participant at BioJapan and Health Ingredients. Following this work an agreement between four New Zealand companies, the industry body and the Hokkaido region in Japan has just been announced. This agreement focuses on product development and R&D. Additionally, the industry body has just finalised a Memorandum of Understanding with its counterpart in Japan.

Although some firms indicated that they are willing and able to organise their own collaborations, other firms indicated that in some sectors this was difficult due to industry specific dynamics. Some firms indicated that in such instances NZTE can play a useful role in bringing firms together collaboratively. Box 14 shows an example of NZTE doing so.

Box 14: NZTE has supported collaboration

A major NZ seafood company that collaborates with other firms within the seafood sector identifies the benefit of networking and sharing knowledge. These collaborations are facilitated by NZTE and Aquaculture New Zealand, an industry body that represents New Zealand Mussel, Salmon and Oysters industries. The firm considers that while collaboration between industry participants within the sector is very valuable, coordination is difficult given the competition and lack of capacity within the sector to facilitate collaborations.

NZTE's approach to assisting many industry organisations includes a strategy for phasing out the support. This can achieve a catalytic effect and avoid dependency. An example of this is NZBIO. NZTE has gradually delegated more responsibility to this organisation and there is a plan for discontinuing the financial support by 2013. Ideally the level of financial support should withdraw gradually over a number of years to maximise these organisations' long term chances.

There are many individual firm-level benefits from Output Class 2 activities

NZTE provided case studies to demonstrate the benefits and success stories of various Output Class 2 activities. The case studies demonstrate that significant firm-specific (private) benefits have occurred, for example benefits from taking part in overseas trade shows or market development programmes. However, these case studies, in general, do not show concrete sector-wide benefits (spillovers) that have arisen through the activities.

Firms, whose participation in trade shows has been part funded by NZTE, report deals and leads resulting from those trade shows. However, it is not clear whether the deals are of higher value added or additional to what would have happened anyway. In some instances, for example the America's Cup project, it appears that already existing business relationships were honed but not many new ones established. It is also unclear how and whether these activities benefit their respective sectors more widely. Interviews with firms and industry organisations on this proved inconclusive. The case studies, in the main, show increased benefits for firms rather than wider benefits and spillovers to the sector.

Our interviews with firms showed that a high proportion of the direct benefits they have received are due to the off-shore services provided by NZTE, including assisting with logistical, immigration and language issues. Firms were very positive about NZTE's assistance with attending trade shows, and providing business development services in off-shore markets. Firms commented on the value of business matching services; relationships that had been developed with potential customers, and in some cases contracts or deals that had been secured. Without NZTE assistance off-shore, firms commented that they would have found entering a new market more difficult, that it may have taken them longer, and they may have attended less trade shows. In particular, firms commented on the value of the 'New Zealand government banner' attached to their business that NZTE representation can bring. In some sectors, eg biotech, NZTE involvement could open doors to, for example, other countries' health service providers or multinationals.

According to the firms that we spoke to, activities to bring together firms in groups had not led to collaborations occurring between firms, for the most part. Firms acknowledged that NZTE had brought New Zealand firms together in the initial stages, and this led to exchange of contacts that firms would later follow up themselves, for example to share information on logistics. But these activities had in general not led to shared business models or collaborations, which may reflect the fact that these firms can be competing against each other. As noted above, there were some exceptions to this finding, particularly collaborations occurring through industry bodies.

Firms that have gone through the Lean Business programme have managed to significantly reduce their delivery times and eliminate waste. Where data on the impact of the programme on firms' productivity exists, it suggests that productivity gains could be as high as 30-50 percent.

Manufacturing Plus has led to firms' refining their business strategy and more ambitious growth targets. It is not clear whether this has a direct impact on their performance.

The Better by Design programme has been highly praised by firms in a previous qualitative review. Programme participants have reported that the programme has had a positive influence on their business but the review was not able to provide a robust quantitative analysis of its impact. As BBD has run since 2003/04 we thought it appropriate to attempt an econometrics based analysis[77] of its impact on participating firms[78]. Data is only available up to 2007, which means that the number of observations was limited and that the analysis could only pick up any immediate or short term impacts. Box 15 summarises our findings. Our interpretation of these results is that it is too early to tell whether the programme has led to significant impact on sales, value added and productivity.

[77] We used the same methods as those that have been used in previous peer reviewed studies
[78] It should be noted that any benefits would be private and not sector wide (social benefits)

Box 15: Better by Design

There is no conclusive evidence of significant short term impact from Better By Design for two of the three groups of firms analysed. There are some marginal positive results on sales, value added and labour productivity for one of these groups, but this effect cannot be clearly seen one to two years following participation in the programme. Given the positive qualitative findings among firms that have participated in the programme, an explanation is that insufficient time has passed for the changes made by businesses to translate into the available data. Our results underline the need for further quantitative analysis as more data becomes available over time.

10.2 Sector benefits, potential spillovers and additionality should better inform the design of OC2 activities

Private benefits are a necessary condition for firms to participate in government programmes, for it is difficult to see why a private business will engage in an activity unless there is a direct benefit. But they are not a sufficient condition to justify public intervention, and should not be a core outcome objective of Output Class 2.

Even where private benefits exist and can be measured, their size may be overstated. NZTE calculations of private benefits frequently assume that the situation at the time of the establishment of the programme would not have changed and make no allowances for improvements not due to the programme. This risks overstating the programme's true impact.

For example, the Lean programme is supported by analysis that assumes that firms would not have implemented Lean without NZTE information and financial support. Feedback from firms suggests that, provided some understanding of Lean exists, they would have implemented it but it would have taken them longer to do so. Therefore the $20,000 grant available to firms for implementing Lean may or may not lead to additionality. The benefit of the grant for a firm is the discounted value of the improvements from the faster adoption of Lean, but not the difference between, say, productivity after and before Lean.

Any analysis of programme impacts and ex-ante business cases would be strengthened by making comparisons against appropriate and realistic counterfactuals, which in general are likely to at least lead to more modest benefits than reported.

While spillovers are mentioned as intervention rationales in board papers and feature in NZTE processes, such as NZTE's intervention logic diagram, they do not appear to be at the core of ex-ante sector policy implementation.

Under the Emerging Technologies SI, the commercialisation of high temperature superconductivity or aluminium alloy powders developed in New Zealand is said to lead to significant (positive) spillovers. The net economic benefit calculations used to support these two emerging technologies are based on external studies commissioned by NZTE. They suggest that there could be significant NEB (titanium alloy powder $387m; HTS $602m over ten years) if the two technological developments were to lead to the emergence of respective appliances industries. But these NEB calculations may overestimate the potential impact. They assume the availability of skilled but unused resources and fail to take into account the production

that will have to be foregone for producing HTS or titanium alloy powder appliances (opportunity cost).

The importance of having a thorough understanding of the opportunity cost is illustrated by the now exited Shanghai Wood Innovation Centre project. NZTE's very good ex-post analysis of why the project failed suggests a lack of appreciation of the opportunity costs firms faced when deciding whether to invest resources in the WIC project. Simply being able to earn a positive profit/return does not guarantee success if a higher (risk adjusted) return can be earned elsewhere. Likewise, a positive return on investing public money cannot be called value for money without taking into account the alternative uses to which the resources could have been put and the returns generated from those other uses.

Box 16: On the use of multipliers in NEB calculations

Multipliers

Multipliers should not be applied at the national level unless there are unused resources that the intervention will draw on and opportunity costs of investing the funds elsewhere are taken into account. The counterfactual is hardly ever the situation at a given point in time but requires extrapolation. Where things happen faster as a result of the intervention, and unless that leads to a first mover advantage or the realisation of opportunities that are temporary and would otherwise be foregone, it is the difference between what happened and what would have happened without the intervention that should form the basis for the NEB calculations. This is often not the same as the situation at the time of the intervention.

NZTE are taking steps to improve the robustness of its methodology to estimate economic impact from its activities. See Box 17 below.

Taking into account wider net benefits (including opportunity costs) becomes particularly important when a project aims to establish a whole new industry. Background papers to the Titanox titanium alloy powders industry clearly state that for New Zealand to have an appliances industry in this area, a wide ranging strategy is needed that includes:

- skills
- public investment (instead of private investment which does not appear to be a hindrance)
- establishing channels to market.

Unless the resources required for this are currently idle, there will be opportunity costs for each one of those resources which, if higher than the benefits, could result in a net cost. Given the significance of establishing a new industry from scratch, and the costs and risks associated, such an activity should possibly be under ministerial supervision.

However, we appreciate that decisions to implement sector programmes and initiatives are made based on a variety of evidence, not just NEB calculations. NZTE are taking steps to improve the robustness of its methodology to estimate economic impact from its activities, shown in Box 17 below.

Box 17: NZTE is improving its method for calculating the economic benefits from activities

Direct Economic Impact estimates

NZTE are taking steps to improve the robustness of its methodology to estimate economic impact from its activities.

To better guide resource allocation, and channel staff time and resources into areas that give the greatest return, NZTE is replacing the potential Net Economic Benefit (NEB) methodology with Direct Economic Impact (DEI). DEI is a longer term measure (three to five years) and reflects the time lag between NZTE activity and the impact being realised. It is one of several performance measures for NZTE.

Key elements of DEI are that "New Zealand Inc." is the unit of analysis; the sources of benefit are additional profits to New Zealand, spend on salaries, wages and suppliers; and scenarios are considered with/without the intervention. The analysis is limited to participating firms and their direct suppliers and employees, with wider spillovers generally included in "soft" measures and commentary. The depth of the DEI analysis will often be related to the size of NZTE's investment.

Successful implementation of DEI is a progressive exercise over multiple years as NZTE learns about what works well and what is realistic to implement.

Careful consideration of the difference between operational and policy decisions is also important when wide-ranging national initiatives, such as the SIs, have been established by the crown entity and not on the basis of ministerial decisions.

NZTE's activities in Output Class 3 and 4, which can include assistance with attending trade fairs, provide firms with opportunities for growth and business development. The rationale for government assistance in general with trade fairs is around coordination failures and distance from markets. NZTE's case studies demonstrate significant benefits to individual firms in taking part in these types of activities.

For example, the Food and Beverage Taskforce is a significant government mandated initiative that has been allocated $19 million over four years. A significant proportion of the activities for the initiative consist of trade shows. While these trade shows have brought benefits to individual firms, we have not seen evidence of these activities bringing wider benefits to the sector.

Our comments in this report do not relate to criticisms of these activities per se. Our comments relate to the reduced likelihood of these types of activities providing wider benefits and spillovers to sectors, which is the intended focus of OC2 activities. Where trade shows are used by NZTE to fulfil a sector objective, such as raising the profile of the ICT sector, NZTE needs to clearly outline how spillovers to the sector are expected to materialise, what additionality is expected, and measure and demonstrate the extent to which these wider sector benefits have occurred. For this evaluation, NZTE has not been able to demonstrate the sector wide benefits from

events such as these[79]. For example, case studies provided to us by NZTE demonstrate only individual benefits to firms.

Our interviews with firms and industry bodies for this evaluation aimed to identify what, if any, benefits had been passed on to other firms in the sector. We found insufficient examples of this occurring to conclude that these activities currently represent value for money for investment in sector development.

MED should share more responsibility for the articulation and implementation of sector programmes

The division of roles between MED and NZTE has not made the most effective use of both organisations' expertise. MED has focused on developing sector policies and has communicated them generally in cabinet papers and through other channels, allowing NZTE to develop appropriate interventions. While there are agreed monitoring arrangements between MED and NZTE, MED does not use this information to instigate ministerial directions to the NZTE board, such as requesting changes to programmes, if there is ambiguity around them.

Previous MED evaluations and recommendations, including expectations stated in cabinet papers and minutes, for OC2 programmes to focus on spillovers have not been implemented.

MED should also lead on advising the government on its long term economic development goals and priorities, ensuring that government agencies are aware of these, and work with agencies to ensure that they are reflected in agencies' strategic planning process. NZTE has generally been responsible for these strategic decisions for sector programmes, arguably due to insufficient ministerial direction and support by MED.

For example, the Strategic Initiatives were decided by NZTE, with some Ministerial endorsement[80]. The recent decision to reduce the number of Strategic Initiatives from seven down to three was also made by NZTE. NZTE communicated these decisions to MED and received some form of ministerial approval. But these decisions impact on long term sector policy, which MED is responsible for in the context of setting priorities and designing strategic interventions. Effectively delegating this responsibility to NZTE also carries the risk of some strategic decisions being out of line with government's overall strategy[81]. MED does not seem to have applied the leadership that the previous review recommended.

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[79] An evaluation of UK Trade and Investment's Tradeshow Access Programme (September 2008) highlighted to us by NZTE, concludes that trade shows provide firms with a wide array of individual benefits. The evaluation notes that there may also be wider spillover effects from the trade show programme, including promoting industries in overseas markets. However, this specific effect was difficult to quantify as part of the evaluation. These findings concur closely with our findings in this evaluation.

[80] The then Minister agreed to fund some activities under the Emerging Technologies SI.

[81] We note elsewhere that NZTE's activities are generally aligned with government priorities.

MED's role should include identifying what role government can play to help sector development, and advising NZTE or other agencies on these areas. This includes establishing the market and policy failures or other rationales that would justify public intervention. The intervention itself might then be handled by crown entities such as NZTE, or through other Crown portfolios depending on the sector needs and issues.

This role for MED is all the more important as NZTE takes a commercial approach that consists of looking for opportunities to invest public funds in activities that generate a return. This may be essential for individual businesses but it is not always best use of public funds as it may neglect additionality and opportunity cost considerations. There is a risk that private activity could be crowded out, and activities that businesses would have paid for are subsidised[82]. MED has expertise that can contribute to the underlying analysis that needs to be carried out to support public interventions and MED should share more responsibility for successfully implementing the sector policy frameworks it develops.

MED's current role in Major Projects and Transformational Initiatives, and through the Economic Growth Agenda, is looking to correct this balance.

There are a number of options for strengthening MED and NZTE collaboration on intervention rationales and ensuring value for money from programmes. These include:

- assessing which programmes could benefit from being under ministerial direction and which should be the focus for NZTE
- considering whether programmes would benefit from different objectives, such as the objectives under different output classes
- finding arrangements to ensure that robust and rigorous ex-ante analysis takes place
- considering inter-agency, including MED, support and input of expertise to enable NZTE to prioritise the resourcing of new and existing programmes.

Better information about sectors is needed

More robust work on intervention rationales and the identification of the role of government in overcoming obstacles affecting sectors is likely to require better information about sectors. A thorough understanding of what is limiting sectors' growth also contributes to the probability of success of sector interventions. There is a risk that even well thought out programmes may fail if they are untimely and do not have the support of the sector they are supposed to assist.

For example, the Shanghai Wood Centre failed in part because the industry did not see its potential and/or because it saw other opportunities it valued more. The National Project Office had sound underpinnings in that its purpose was to facilitate the collaboration between New Zealand engineering firms to obtain bigger contracts

[82] This risk exists for all implementing agencies, without a sound rationale behind activities.

they could not handle on their own. Its success, however, was limited. A better understanding about the reasons as to why firms did not collaborate on a scale deemed beneficial may have increased its impact.

In general, the lack of sufficiently thorough problem definitions and intervention rationales is a reflection of the insufficient understanding of problems and how government can address them. The responsibility for collecting better information may be one that both organisations, MED and NZTE, could usefully share.

The financial and staff resources in Output Class 2 should be more transparent

Approximately half of the funding of OC2 of $47 m per annum is spent on the programmes themselves, with the other half being used for staff and overhead costs. In line with their overall funding and total number of FTEs, NZTE have managed to calculate that Output Class 2 funds around 130 FTEs.

A number of FTEs engaged in OC2 activities are also engaged in programmes delivered under other output classes, notably Output Class 3: Analysis and Development Services for Firms and Output Class 4: Identification and Coordination of International Market Opportunities. While it is entirely appropriate for NZTE staff to work across output classes, it is difficult to establish how many resources go into delivering OC2. It is likely that some transfer of resources and funding out of OC2 would lead to a more accurate reflection of the work done by NZTE staff. NZTE estimate that approximately 10 percent of the total OC2 funding should be transferred to other output classes.

We consider that this 10 percent estimate is a conservative estimate of the extent to which OC2 supports NZTE overheads and staff costs, including offshore services in other output classes. Care should therefore be taken in considering the impact of any changes to OC2 resources.

In addition, it is not clear how some OC2 activities, notably trade fairs, international market scoping studies and the identification of overseas market opportunities, are different from what these other two output classes aim to deliver. This is especially so given the absence of a wider (sector) focus of many OC2 interventions. There is a risk of some OC2 activities increasing the scale of Output Class 3 and 4 activities without actually contributing to the objectives of OC2. This risks overstating the cost-effectiveness of Output Classes 3 & 4.

Performance measures should give a clear indication of sector benefits

While NZTE has achieved the majority of its performance measures for the output class, NZTE's current performance measures for OC2 do not give a good indication of progress towards achieving the sector wide objectives and outcomes for the Output Class. NZTE should develop particular performance measures for Output Class 2 that provide better information to demonstrate progress towards achieving sector wide benefits. For example, NZTE might usefully collect and analyse information on the following areas:

- Productivity growth in key sectors.
- The numbers of collaborations developed as a result of OC2 activities.

- Numbers of new business models in operation as a result of OC2 activities.
- Numbers of spin-off companies.
- Number of new products commericalised in markets.
- Numbers of sets of lessons on a market/technology/project disseminated across a sector.

NZTE could better align its sector activities with other organisations

NZTE has played a significant role in developing some industry organisations, both financially, including under contract, and through providing support for organisational and sector leadership. In our view, this is an appropriate and useful way for NZTE to facilitate sector activity.

However, NZTE needs to ensure that its activities do not duplicate the activities of existing organisations, and needs to make careful judgements on the balance between seeding industry organisations and knowing when to exit activities. These judgements will differ depending upon the individual industries, their stage of growth, and the extent to which other organisations exist that can fulfil any necessary roles.

For example, several industry bodies informed us that they organise conferences, provide seminars and networking events for firms, provide market intelligence to firms on particular overseas markets, organise representation at trade shows, and facilitate collaborations to innovate among firms both in New Zealand and overseas[83]. There are also a number of additional organisations that exist to facilitate collaborations and innovations among firms. These are the same types of activities provided by NZTE in OC2, and there is the risk that NZTE's activities potentially duplicate the functions provided by other organisations.

While NZTE has considered the specific activities that these organisations undertake, and sought to provide activities that complement these organisations' efforts, it is not clear in principle why these existing organisations could not undertake the activities provided by NZTE, with additional financial assistance. Duplication of the functions provided across these organisations and NZTE does not make the most efficient use of public funds. There is also the risk that NZTE crowds out activity that could have been provided by either a private or alternative public solution.

We agree with NZTE's view that they should continue to fund industry bodies to provide public good type activities, including capability building and information gathering, on a case by case basis. This is particularly so, given industry bodies' ability to reach a wider range of firms in a sector.

OC2 activities should benefit more firms across sectors than currently achieved

NZTE could more usefully benefit firms across sectors through its sector activities by widening their scope beyond those firms that have an existing client relationship with

[83] This finding is drawn directly from interviews with stakeholders and analysis of the activities across organisations.

NZTE. As at December 2009, NZTE has 1043 firms on its OC2 client list[84]. NZTE informed us that around half (474) of firms on the OC2 client list are not intensively client managed firms. This leaves around half of the OC2 client list that are engaged with NZTE through its other Output Classes.

There appear to be many firms across New Zealand that are as yet not targeted by NZTE's sector activities. Stakeholders had a perception that NZTE tended to focus its sector activities on those firms engaged through its other Output Classes. While the numbers show that this is true for only half of the OC2 client list, this is a small number of firms compared to the number of firms in New Zealand (some 500,000). An estimation of firms eligible to be targeted by sector activities would be useful[85]. There is also a perception by firms and stakeholders that NZTE's sector activities are hard to access outside of an existing client relationship with NZTE. NZTE's project work provides an opportunity for engagement with a wider group of firms who may not be eligible for in-depth client management.

We found that industry bodies are more likely to focus their activities on all firms within the sector, and target a wider number of firms, regardless of their size. NZTE should continue to grow its involvement with these bodies through OC2 activities.

Given the successful work that NZTE has done to develop industry bodies, NZTE should consider how long its own efforts are necessary given the existing capability within industry to organise and undertake similar activities to those organised by NZTE. It may be appropriate for NZTE to continue to play a leadership role and help to facilitate industry organisations to undertake the sector activities that they do, for example through continuing to contract industry organisations to deliver specific events and deliverables.

We found evidence that firms are willing to, and are already engaging in, collaborations where they see that there are opportunities to do so. It is therefore important that NZTE sector activity does not crowd out existing commercially driven collaborative activities.

10.3 Lessons from the last decade for future sector policy

The success of any sector policy is highly dependent on its implementation. For sector policies to be most likely to be effective and efficient a robust policy process, including the following, is required:

- Identify the problem and describe it in terms of a market or regulatory failure - who is affected, is it likely to persist, what's the extent/cost of the problem and can government do anything about it?
- Describe the government intervention and its activities, the market failures it would address and estimate the costs and consequences of government intervention.

[84] This number does not give an indication of the intensity of engagement and involvement with these firms through OC2 activities.
[85] For example, there are around 2800 New Zealand firms that are continuous exporters and a further 9000 firms that are intermittent merchandise exporters.

- Set clear, measurable objectives, performance measures and timelines.
- Develop monitoring and evaluation indicators to quantify the intervention's impact and ensure relevant data will be available.

Identifying market imperfections may be difficult and subject to debate, and governments may sometimes make decisions for political rather than economic reasons. In these cases, any rationale should be supported by evidence, and explicitly stated. For economically motivated decisions, a clear market failure based rationale:

- Helps shape policy to target specific problems and ensures that it is proportionate to the problem it addresses, thus minimising any costs it may produce.
- Helps target activities towards areas where government intervention is likely to lead to net economic benefits.
- Minimises the scope for interest groups to influence the government intervention to their private advantage.
- Facilitates the attribution of any changes to the intervention.

The division of responsibilities between MED and NZTE will need some alignment to facilitate the implementation of these steps. MED has a comparative advantage in providing underlying analysis, whereas NZTE's comparative advantage consists of its proximity to business and international markets, and the commercial perspective it shares with business. For sector policy to be successful and to ensure value for money, its implementation needs to draw on the strengths of both organisations.

10.4 Recommendations

Based on the findings of this evaluation, we recommend that:

1. A process is agreed among agencies to resolve the substantive issues identified in this evaluation.

2. Further work is undertaken to identify the most effective balance of responsibility between MED and NZTE for developing and implementing sector policy, including developing intervention rationales, objectives, success criteria, and sunset clauses.

3. Sector activities are re-designed to specifically and explicitly provide the types of intended sector wide benefits highlighted in our report.

4. Better evidence and analysis is gathered to underpin the nature and extent of the sector problem that government should address, including the appropriate level of government intervention.

5. Further work is undertaken to clarify the transparency of financial and staff resources in Output Class 2, and other output classes.

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Appendix 1: Evaluation questions

The evaluation addressed the following questions. Because these questions were developed before any analytical analysis had been carried out, they are best understood as providing a steer for the evaluation. In the process of compiling and assessing the evidence for this report it became clear that some questions were more important than others. The analysis in the report reflects this.

Questions addressing outputs

1. Have performance measures been met? If not, why not?

2. Have current performance measures (outputs) provided useful information on achieving objectives and outcomes? Are they sufficiently challenging or too challenging?

3. How does Output Class 2 reach and engage its main target groups? Are there any gaps in the portfolio of activities that prevent Output Class 2 from reaching its full potential?

4. How many firms have received support via Output Class 2 and how has that benefited their sectors?

Questions addressing funding

5. What has been the breakdown of the funding between 2006/07 and 2008/09 in terms of:

    a Overheads and staffing

    b Development of Regional Strategies

    c Projects funded from the Regional Strategies Fund

    d Assessment of regional strategies

    e The Enterprise Culture, Skills, and Activities Fund

    f Each of the Strategic Initiatives

    g Better by Design

    h Each of the Key Sector Projects.

6. What were the reasons for reprioritising funding?

Questions on reprioritisation decisions

7. Which sectors have been targeted and how were those sectors, sector projects and sector initiatives selected? What were the criteria and how were they used?

8. How are decisions on funding priorities made?

9. What are sector specific objectives of the initiatives and projects and how have they been determined?

10. What direction did NZTE receive from government for selecting sectors and prioritising activities? What was MED's role in this?

11. What were the policy direction and objectives given by MED for the sector projects programme and were they sufficiently clear?

Questions on efficiency

12. How have the funding for the individual activities and the number of clients/services evolved over the years?

13. What has been the impact per dollar of public investment?

14. How do Output Class 2 activities compare with other similar activities in New Zealand or abroad?

Questions addressing effectiveness

15. Have connections within and between sectors been strengthened?

16. Have sector capabilities improved?

17. Have results contributed to productivity improvements?

18. Have firms/sectors that have benefited from Output Class 2 been able to take advantage of international market opportunities?

19. What has the impact of individual activities been on participants' productivity, value added, growth, employment levels, etc?

20. By how much do the net benefits of the individual activities, eg SIs, vary from one activity to another?

21. What would have happened in the absence of Output Class 2 activities, or some of its initiatives?

Appendix 2: Interview questions

The following questions guided the interviews with firms.

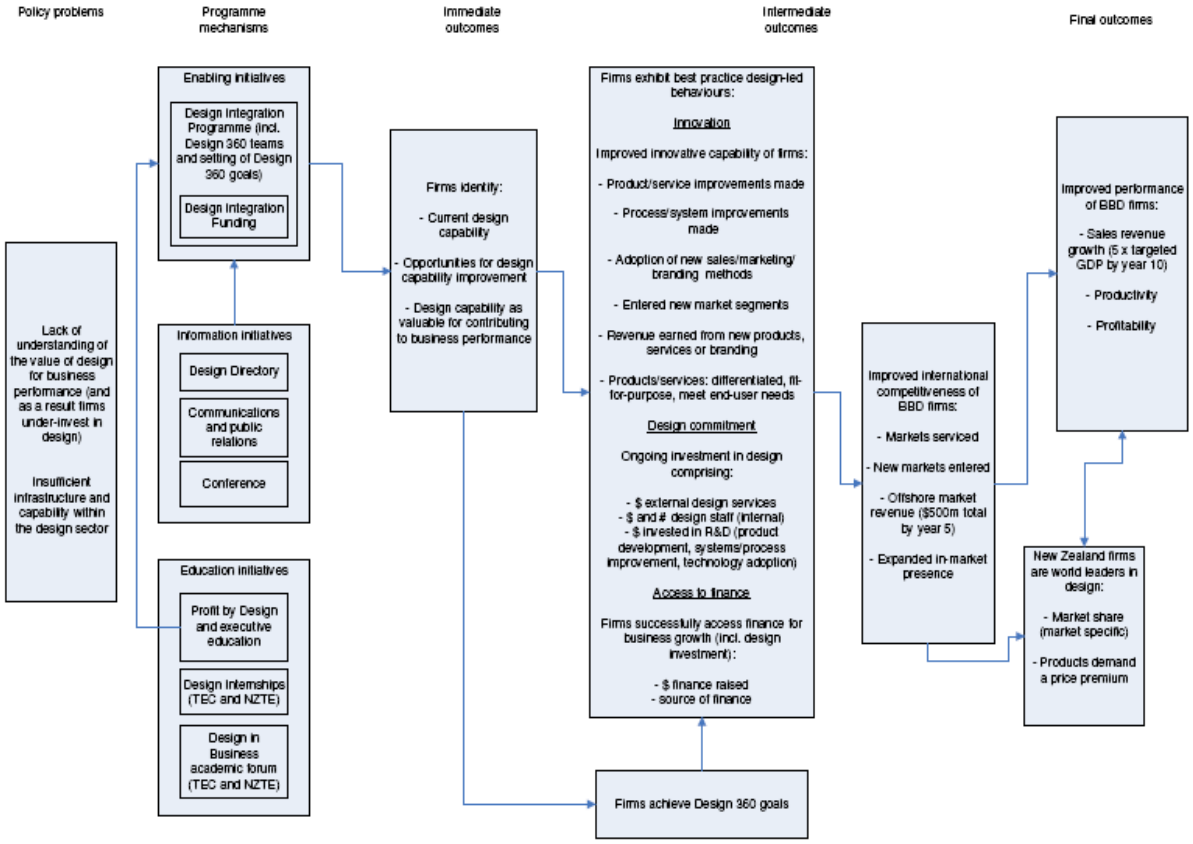
1. By way of introduction, please can I check my understanding of your business, for example:
    a. Age of company/history
    b. What do you produce (major markets and products/services)?
    c. Turnover, no. of employees, exports, etc
    d. Evolution of the above
2. What forms of government/public assistance have you received?
3. Please explain the nature and length of NZTE support which you have received.
4. NZTE has a range of sector activity which I would like to discuss in a little more detail with you. (This has included…explain). How were you first alerted to and engaged in these sorts of activities?
5. Apart from the sector support (may have to explain further), have you made use of any other NZTE services (might have to give example)?
6. Were you satisfied with the level of support and/or its accessibility?
7. How important has NZTE support been? For example:
    a. What direct benefits has it produced for yourself (private) and more widely, eg benefits generated to others in the sector, your suppliers or your (NZ based) customers? (This includes…explain)
    b. In money terms?
    c. Could it have been sourced from somewhere else (eg an industry body or training provider) and if so, at what cost?
    d. Would you have paid for the NZTE support, or been prepared to part-pay?
8. What would have happened without it?
9. How could NZTE better focus its resources in supporting firms? (For example, are the people and contacts or the information and other services such as access to specialist expertise most useful, and could NZTE activities be made more relevant to business' needs? How?)

10. How do you see your i) sector and ii) organisation developing in the future?
    a. How important are sector specific issues to your business?
    b. What are your goals?
11. What support will you require from NZTE, and government more widely, in the coming months/years?
12. Do you have any other comments?

Appendix 3: Logic Model of OC2

Output Class 2: Logic Model				
Problems	**Outputs**	**Immediate Outcomes**	**Intermediate Outcomes**	**Ultimate Outcomes**
• Fragmentation and lack of collaboration within sectors inhibiting growth	• Firms, sectoral industry bodies and regions develop strategies and plans for improved performance	• Strengthened collaborations within sectors and stronger direction for sector development	• Step change improvements of sectors in: - Business strategies and practices - Process and product innovation - Access to finance	• Increased rate of sustainable economic growth for the sectors and NZ as a whole, particularly through productivity improvements as measured by: - Exports as % of turnover - Growth in turnover - Value added per FTE - Profits as % of turnover
• Complexity of international markets leading to suboptimal export performance	• To fund projects that improve innovation and international competitiveness, and that build institutions and capability	• Improved links between sectors and international connections	• Increased involvement of sectors in significant international market opportunities as measured by: - Market knowledge - Market connections - Market presence - Overseas sales	
• Weak linkages between sectors hindering spread of transferable knowledge and technology	• Sector initiatives and sector projects developed and implemented by NZTE	• Improved and timely understanding of issues and opportunities, eg finance, for specific sectors and across sectors by government and sectors	• Improved international competitiveness of BBD firms, offshore revenue ($500m total by year 5)	
• Lack of understanding by businesses of value of design leading to insufficient infrastructure and capability of design sector		• Uptake of design improves innovative capability and ongoing investment in design	• NZ BBD firms become leaders in design and products command a price premium	

Appendix 4: Better by Design Intervention Logic diagram



Source: Review of Better by Design Programme of Initiatives, LECG, 2008

Appendix 5: Overview of econometric analysis of the impact of BBD

We employ the same microeconometric techniques that were used for the review of the Growth Services Range. For this analysis, we cannot simply compare outcomes for firms that receive BBD with a random group selected from the business population. Firm outcomes, such as sales, value added or productivity, are likely to be influenced by characteristics of the firms, such as their size or exporting history. Additionally, we know that BBD recipients are not randomly selected; the focus is on those firms that have the potential for high growth. We need to compare like with like in order to determine the impact on outcomes that is solely due to participation in the BBD programme.

We use panel data techniques and a matching method. The former is a regression approach, whereby a set of explanatory variables *X* (firm characteristics) is used to explain the dependent variable *Y* (firm outcomes). The effects of the 'treatment *T*', here receiving BBD, can then be identified by including a dummy variable α in the regression. Statistical tests determine whether the BBD variable is significant, ie whether BBD has a positive impact.

$$Y_{it} = \gamma Y_{it-1} + \boldsymbol{\beta}\mathbf{X}_{it} + \alpha_t T_{it} + \varepsilon_{it}$$

There are many factors that we cannot observe that may influence firm outcomes, such as a firm's management practices or the skills of its workforce. These appear in the error term in the above equation, leading to a bias in our estimate of the BBD impact α. The standard approach to panel data is to remove any fixed effects, ie differences between firms that are time invariant and firm specific, including those that we cannot observe. One common way of doing this is by first differencing, in other words by subtracting the previous period equation from the present period one

$$\Delta Y_{it} = \gamma \Delta Y_{it-1} + \boldsymbol{\beta}\Delta\mathbf{X}_{it} + \alpha_t \Delta T_{it} + \Delta\varepsilon_{it}$$

where Δ is the first difference operator, (ie $\Delta Y_t = Y_t - Y_{t-1}$). The basic idea is to remove any time invariant fixed effects so that one is left with a set of independent variables that together can explain the dependent variable (outcome variable), in this case productivity, sales or value added. Our method allows for past values of outcomes to influence the outcome in the current period and is thus an enhancement on the commonly employed difference-in-difference estimator.

Matching models match firms that receive the assistance with firms that do not. Firms are matched on the basis of a set of characteristics. As there may be a very high number of characteristics that could be considered, firms are generally matched by establishing an index, or propensity score. The propensity score is the (conditional) probability of receiving the assistance, given pre-treatment characteristics. It is then assumed that firms with the same propensity have the same probability of receiving the assistance, ie they are chosen at random. This allows for a comparison of whether the treatment has an impact. The underlying idea is that firms with the same propensity score should have the same outcome and that any improvement on the part of those in receipt of the treatment is a direct result of that treatment.

For the purpose of the analysis, BBD recipients are combined into three groups of firms and the impact of BBD is analysed separately for each group. This approach is necessary because the majority of BBD firms have received at least one other form of assistance from FRST and/or NZTE, making it very difficult to isolate the impact on firm performance due solely to BBD:

Group 1

BBD firms that have received both previous Technology New Zealand assistance from the Foundation for Research, Science and Technology (FRST) and previous services or grants from NZTE assistance (other than BBD).

Group 2

BBD firms that have received previous other NZTE assistance but no assistance from FRST[86].

Group 3

A subset of Group 1: BBD firms that have received assistance from FRST and are client managed by NZTE.

Data description

The panel data techniques and the matching methods are used on all three groups of firms. The industry-year means for all continuous variables are removed prior to our analysis, in order to remove the impact of macroeconomic shocks which influence all firms in the same industry and year.

The data used for our econometric analysis do not extend beyond 2007. This is a serious limitation as it only allows for at most two years of outcome data to examine the impact of BBD. It is possible that the impact will not be seen for several years after a firm has participated.

Results

Panel Data Technique

There is no conclusive treatment effect for Group 1 and Group 3 firms (ie those with previous FRST and NZTE assistance) according to the regression results. Although the coefficient signs are positive, they are not statistically significant. This means that the regressions do not detect a significant short term benefit from BBD on sales, productivity and value added over and above the assistance firms receive in the form of other NZTE and FRST support. (Note that our analysis does not measure the impact due to receiving the other NZTE and FRST assistance)

There is some evidence of a positive significant impact on sales, value added and productivity for Group 2 firms. This would mean that firms that have received previous other NZTE assistance but no FRST support may see short term benefits from BBD.

[86] This refers to a group of firms that have received other NZTE assistance (that is, not BBD assistance but other types of NZTE assistance) and **no** FRST assistance.

However, the results are sensitive to specification and the number of treated firms is particularly small for this group.

Matching technique

The results from the propensity score matching method are broadly similar to those obtained from the regressions. No significant impact is detected for groups 1 and 3 but there is again some indication of a positive impact on Group 2.