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Report to:

Industry Training Federation

THE ECONOMIC COSTS AND BENEFITS OF INDUSTRY TRAINING

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The Economic Costs and Benefits of Industry Training

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1 Introduction

In recent years the officially recorded total cash funding of industry training has been approximately $300 million per year. Of this sum, approximately 70 percent has been provided by government and 30 percent by industry. Industry, employers, and employees also provide additional cash for training-related costs and 'in kind' resources such as time for training.

The number of industry trainees with training agreements with Industry Training Organisations (ITOs) has been high in recent years, sitting at 133,000 in 2008, but this figure declined in 2010 to 102,000. Between 2006 and 2009, the recorded total cash funding of industry training implied an average cost per trainee per year of $1,850 to $2,300.

Data and information has been obtained from interviews across the industry training sector, and from a number of industry surveys completed by ITOs, on the costs and benefits of industry training within businesses. This information has resulted in two main types of training being identified: Role Productivity Training, and Occupation and Trades training. These two types of training have quite significant differences in terms of their annual costs, the expected incidence of benefits between employer and employee, and consequently the usual incidence of costs as between employer and employee.

An analysis of the training costs observed mainly by employers enables the estimation of the total costs that make up 'in kind' costs. These are costs that do not qualify as 'industry cash contributions' as per the Tertiary Education Commission definition or as government contributions. In some instances these costs are considerable. For example, an analysis of training costs for Occupation and Trades training over the course of a trainees' career indicates the considerable investment employers and employees make in training, to generate the skills, experience and qualifications required.

An analysis of the benefits of industry training shows that Role Productivity training generates relatively high returns within a short timescale, while for Occupation and Trades training the benefits may continue for many years.

This analysis of the costs and financial benefits of industry training enabled the measurement of the net annual benefits per trainee and the Benefit Cost Ratio (BCR) from training expenditure. These can be measured as the dollar benefit per $1.00 spent on training. The BCRs of different types of training, and at different times during the training process, was then tested through interviews with industry stakeholders. For example, employers supporting Occupation and Trades trainees stated that in the early years of their

training, the business made no money out of their industry trainees. This is shown to be the case in a number of industries.

The level of benefit is not always apparent to the employer and employee, especially early in the training process. However the eventual benefits are significant. If there are external benefits to the national economy from the human capital created by industry training, then there is justification for the nation to contribute to training costs to encourage a greater level of industry training than would otherwise occur.

Our experience with modelling the New Zealand economy is that, at a national level, the returns to the New Zealand economy of an additional skilled person are high. The acquisition and application of improved industry relevant skills can be associated with higher productivity and are in line with increased income and superior export performance. Further, higher skills potentially provide a longer-term foundation for the application of research, innovation and market-oriented industries.

As such, specific experiments were carried out using a general equilibrium model of the New Zealand economy. In particular, the experiments modelled various industry training scenarios that focused on different levels of public and private sector funding in industry training. The results of these experiments were demonstrated in the effects on Gross Domestic Product (GDP) in the short and long- term. These levels of change were then cross-checked against the costs and benefits and BCRs from the ITO information.

The analyses of components and incidence of costs and benefits and the Benefit Cost Ratios provide a sound description of the actual place of training, and the economic benefits of training within industry in New Zealand. These findings, along with the findings from the macroeconomic modelling of different scenarios of industry training funding provide a sound basis for testing the rationale for public and private sector investment in industry training in New Zealand.

2 Economic costs of industry training

Industry Training Organisations (ITOs) are recognised by the Minister for Tertiary Education under section 5 of the Industry Training Act 1992. Under the Act, ITOs in New Zealand have three main roles. They are required to:

- Arrange for the delivery of industry training that enables trainees to attain these standards
- Design national qualifications and run moderation systems to ensure fair, valid and consistent assessment against national standards
- Provide leadership to their industries on skill and training matters, identify current and future skill needs, and work with employers and employees to meet those needs.

Under the Industry Training Act 1992, and as part of fulfilling these key roles, the Government expects that ITOs will:

- Work with industry to ensure that vocational learning meets industry needs
- Enable working New Zealanders to complete nationally recognised qualifications
- Create clear pathways towards advanced trade qualifications at levels four and above
- Build and maintain strong support from the industries they serve.

ITOs equip learners who are already in the workforce with relevant, work-focused skills. These learners include apprentices and industry trainees as well as those studying for higher-level trade, technical or professional qualifications such as supervisors, project managers or employers.

In the following sections of our report we discuss the costs and benefits of industry training, borne by each of the four stakeholder groups. These stakeholders groups are:

- employers
- employees
- industry
- the Government and the New Zealand economy.

2.1 The stakeholder costs of industry training

Each of the four stakeholders (employers, employees, industry, and the Government) carry a range of costs associated with providing industry training.

We first look at the sharing of costs between the Government and industry. We then explore the two main types of training, and how the nature of the costs in each differs. We then consider the incidence of the costs between employer and employee according to general expectations of the incidence of benefits.

Section 3 covers the level and incidence of private benefits of industry training, and in Section 4 the broader public good benefit to the national economy is explored.

2.2 Sharing training costs between industry and government

The major measured costs of industry training are cash funding through ITOs. These flows are published by the Tertiary Education Commission. The total funding contributed to industry training by industry and government has increased from $138.7 million in 2003, to $290.9 million in 2009.

2.2.1 Industry and government annual shares

The industry cash contribution has increased from $41.2 million in 2003 to $87.5 million in 2009. Over the same period the government contribution has increased from $97.5 million in 2003 to $203.5 million in 2009. These respective increases have seen the ratio of industry cash contribution to government funding continue at about 30 percent industry : 70 percent government over the period.

Table 2.1 Industry and government cash contributions to training 2003-09

Year	Industry cash contribution ($000s)	Government Funding ($000s)	Total Funding ($000s)	Industry funding (% of total)	Government funding (% of total)
2003	41,205	97,549	138,755	30	70
2004	46,419	124,823	171,243	27	73
2005	55,271	136,718	191,989	29	71
2006	61,061	166,784	227,846	27	73
2007	66,258	190,579	256,838	26	74
2008	70,603	198,099	268,702	26	74
2009	87,487	203,466	290,953	30	70

Source: Tertiary Education Commission

The industry 'cash contribution' includes only costs that are evidenced by an invoice, and does not cover the full economic costs incurred by industry. The industry cash contribution

is that recorded by the ITOs following the guidelines for Performance Measure 18 (PM18) of TEC. The cash contributions are defined as *'All costs incurred and recorded through the ITO and costs incurred through training providers and industry parties (whether it is the trainee, employer or other) where evidenced by an invoice.*' The last phrase is important because the word 'cash' has been used to specifically exclude 'in kind' costs. These are said to be subjective and expensive to measure and record.

The major 'in kind' costs will include the downtime during on-the-job training, release time wages, and/or costs for replacement of staff who are attending off-site training, as well as accommodation and travel where relevant. Other costs excluded are those related to trainees that do not qualify for ITF funding, for example trainees without training agreements.

2.2.2 Average industry and government cash costs per trainee

The estimate of the average level of costs per trainee covered by the industry cash contribution and by government funding depends upon the measure of trainee numbers adopted. If we take trainees as measured by the ITO throughput per year (which will include a number of trainees on short courses), the industry cash contribution is between $400 and $480 per trainee, whereas the Government cost is $1,120 to $1,150 per trainee. The total cash cost per trainee is between $1,550 and $1,600.

If we take the snapshot measure of the number of trainees on training agreements as at 31 December in each year, the industry cash contribution has been $500 to $700 per trainee per year, and government funding $1,460 to $1,600 per year. The total of these costs has been about $2,000 to $2,300 per trainee per year.

This number clearly varies among industries, and we have obtained costings that in one industry are as low as $220 for industry, or 17 percent and $1,100 for government, or 83 percent. This was a total of just $1,320 per trainee per year. Another industry example had a company cash cost of $1,240 for training fee and accommodation etc. and TEC funding of $2,870 which follows the average pattern of 30 percent industry cash contribution and 70 percent government (TEC) funding.

2.3 Industry training types and costs

Our research shows that there are two main types of industry training, and that the nature and level of costs, and the incidence of these costs among industry stakeholders is different for these two types. We shall call these two Role Productivity training, and Occupation and Trades training.

- Role Productivity training is the training of specific skills to increase productivity in specific roles within a particular business. These skills may be to some extent portable to other businesses or other countries, but probably not to other industries.

- Occupation and Trades training is training in a range of skills and experience particular to an occupation or trade, and skills that are portable to other businesses and to a large extent to similar roles in other industries.

The training costs borne by industry include the cash contribution covered by invoices for:

- Specific cash costs of the industry contribution to the ITO and the training courses.

- Accommodation and travel for staff sent away to training courses.

The industry also covers the 'in kind' costs that include:

- Wages while the staff are on courses.

- Replacement labour to cover the staff in training. This replacement labour can be of a lower productivity, causing reduced value of output.

- The time of supervisors and business owners acting as mentors, on-the-job tutors or assessors.

- The business interruption that can be caused by tutors and other training support staff working with trainees in the work environment.

These costs are borne by either the employers or the employees. Of the industry 'in kind' costs, usually only the staff wages while on training, and the replacement staff costs are estimated and included in industry costings of training provision.

The 'in kind' economic costs are generally dominated by the wages paid to trainees while on block courses and the replacement labour while they are away. The off-site training courses usually range from 6 days to 18 days per year. However, the cost of the reduced output because the replacement employee is less efficient, and of the supervisor time spent with the trainee can be considerable 'in kind' costs. The 'in kind' cost estimates are frequently at least as costly as the invoiced cash costs as allowed by the Tertiary Education Commission under Performance Measure PM18 as the industry cash contribution.

2.4 Role Productivity training costs

Role Productivity training is targeted to generate a skill or range of skills that will increase the productivity and effectiveness of the trainee in their job in the specific business. This training may be of relatively short duration, and will usually be provided by other staff in the business. There is however usually an external training element which requires funding from industry and the Government contribution. This will also require the employer or employee to cover the 'in kind' costs of staff wages and replacement labour.

The industries where we have been able to obtain costs of Role Productivity training are mainly in the primary sector. A set of these estimates of annual costs per staff member trained is shown in Table 2.2.

Table 2.2 Costs of Role Productivity training

Employers' business *Skills*	**Notes**	**Training cost** *$ per Trained staff*
Dairy farms		
All required skills		$2,452
Sheep and beef farms		
All required skills		$3,505
Orchards and vineyards		
All required skills		$5,580
Pork farms		
Breeding or grower units		$5,008
Seafood		
New crew: sea-processing		*n.a.*
Reduce product downgrade	Marginal cost	*$2,743 (1)*
	Cost 250hrs/Trainee	*$42,667 (2)*
Shore factory 6mth training	160hrs/trainee	$8,400
Quarries		
Processing or movable plant	All years	$3,250

Sources: ITO studies, Industry interviews, BERL

Notes: (1) Estimated from the reported BCR.
(2) Actual costs are much lower as training is done by internal staff at low demand times: No training provider costs, no wage cost for trainee staff time.

The first point to note is that the training costs here, including the industry and government cash contributions and the industry 'in kind' costs are in the range $2,452 to $8,400. The average of the six recorded figures (not in italics) is $4,700 per trainee per year.

This compares with the overall national average for the total of the industry and government cash cost contributions which have been about $2,000 to $2,300 per trainee per year. This

implies that in these Role Productivity training situations, the industry 'in kind' cost is of the order of about $2,400 or a little more per trainee per year.

The second point to note is that where the training is done by internal staff, and can be done at times of the year when there is low demand on their time for production, the economic cost of training is much reduced. The estimate on the table was made in a case study by a seafood company whose figures implied that the external training cash costs (business and government contribution) was about $2,740, and the staff time and trainers' time was at times when it did not impact on output. Had the full costs of trainees' time and trainers' time been necessary for the training, the cash and 'in kind' cost would have been $42,667 per trainee.

This illustrates well the effectiveness and efficiency of industry training being carried out in the workplace, with supporting external tuition.

2.5 Incidence of Role Productivity training costs

The Role Productivity training can have an immediate and significant effect on the productivity of the trainee. As we indicated, the skills may be transferable if the trainee transferred to another business, but are not usually directly transferable to another industry.

The employers therefore generally cover the costs of training, both 'in kind' and the cash contribution required as counterpart to government funding.

The employees do receive a benefit from the training because, being more productive, they are likely to earn an increased income from that employer. However they do not necessarily have a set of skills that will ensure they have a lifetime occupation. This also implies that should the business or industry they are in suffer a downturn their skills will not necessarily obtain them work in another industry. The skills provide limited protection from future unemployment.

Because the skills obtained from Role Productivity training provide relatively limited benefits to the employee, the incidence of the costs of training fall generally on the employer. Additionally, because much of the training is done on-the-job, the employee is not required to forego large amounts of their own time as an 'in kind' contribution from them to their training.

2.6 Occupation and Trades training costs

Occupation and Trades training is designed to generate a range of skills and experience that will enable the fully trained person to carry those skills to other businesses in their training industry, and to a large extent to carry those skills and that experience to similar roles in other industries.

This training period is generally of a significant duration, usually two to four years of training, with perhaps further study for a diploma thereafter. In order to obtain the range of skills the trainee will require external study and tuition, and may well work in a number of businesses to obtain the range of experience necessary to practise in the occupation or trade. This will also require the employer or employee to cover the 'in kind' costs of staff wages and replacement labour, mentoring and on-the-job training as well as significant amount of study time by the trainee.

We have obtained information on the scale of commitment and costs of this Occupation and Trades training from a number of sources, and believe that it is best explained using an illustrative model. We show the estimates of the costs of Occupation and Trades training in Table 2.3.

Table 2.3 Costs of Occupation and Trades training

Occupation and Trades training	Training cost
	$ per Trained
Cash and 'In Kind' costs	
Average cost per year, training Years 1 to 3	$15,000
Cost of training when trained, e.g. Year 6	$5,000
Accumulated training costs Years 1 to 8	$75,000 (1)

Sources: ITO studies, Industry interviews, BERL

Notes: (1) Accumulated training costs for the first eight years including training and then trained employment.

This model shows that there is a considerably greater annual cost to Occupation and Trades training than there is to Role Productivity training. The costings we obtained indicate that the cash contribution is generally more than half of the training cost in the early years, however the 'in kind' costs counted were only the time costs and did not include such things as the impact of overhead costs required to support a trainee employee.

The 'in kind' costs would be considerably greater also if the costs of the internal trainers' time was counted.

Many of the management staff running industry training said that in the early years trainees made no contribution, that after five or six years they became useful, but that the real training cycle is eight to ten years. This model therefore shows that the accumulated training cost in many Occupations and Trades is of the order of $75,000 or more.

2.7 Incidence of Occupations and Trades training costs

The Occupation and Trades training requires a period of time, up to a year or two, before the trainee makes a significant contribution to the output of the employing business. However, once the employee is fully-trained, the skills will be transferable to work in another business, and in most cases are directly transferable to a work role in another industry.

The employees therefore receive a major benefit from this form of training. They are not only likely to earn an increased income from that employer, but also they have a set of skills that will ensure they have a lifetime occupation. This also implies that, should the business or industry they are in suffer a downturn, their skills will probably be broad enough and transferable enough to obtain them work in another industry and/or in another country. The skills provide a significant, lifelong protection from future unemployment.

In recognition of the benefits that they gain, the employees therefore often cover the cash costs of training, including the industry contribution to the ITO, the tuition, the learning packages, and the 'in kind' contribution of learning the theory and studying in their own time. Many employers reimburse the trainees for the cash contributions when the trainees pass their courses. The employers generally cover the 'in kind' contribution of the trainees' time while on block courses, and the replacement labour cost.

The cost to apprentices and trainees to undertake industry training varies across industries and sectors. In trades and technician occupations for example, the wages of an apprentice may be paid while they undertake training off-the-job at an Industry Training Provider (ITP), along with their travel and accommodation costs. However, some apprentices may have to pay for their exam, and their employer will reimburse them if they successfully pass.[1] In sectors such as this, the employer bears most of the costs, including the cost of labour lost due to the apprentice or training attending training off-the-job.

2.8 Industry costs of industry training

At an industry level the main costs arise from supporting the industry's ITO; contributing to various industry training advisory groups; and being available as necessary to provide input on the desirability, applicability and need for qualifications and standards.

[1] Interviews with Ken Stirling, Electricity Ashburton, 8 September 2011; Bob Martin, Area Training Advisor for JITO, 31 August 2011; Jason Hazelwood, General Manager of Construction, Counties Power Limited, 30 August 2011; Craig Fleet, Trainee Advisor for JITO, 2 September 2011; Craig Cochrane, National Operations Manager, PGDRITO, 22 August 2011.

In many industries employees pay their training courses directly. All trainees are also expected to contribute their own time and enthusiasm to learning the aspects of the skills needed for their vocation that are not experienced and learnt in day-to-day work on the job.

Finally, because skills training has externality benefits to the national economy, main public sector bodies, especially central government, contribute to the success of the economy by supporting industry training. The main support is in funding, and also providing a sound regulatory framework for training, qualifications and standards.

3 Economic benefits of industry training

As with the costs, so with the benefits of industry training, there are four main stakeholder groups. This section looks at the benefits to the private sector stakeholders, namely employers, employees and industry, and the following Section 4 explores the benefits to the government and the New Zealand economy.

3.1 Measuring benefits from industry training

Industry training is very widespread as a practice by employers in most industries. It could therefore be expected that employers are aware of the private benefits to employers of industry training. We would also therefore expect that there would be well-documented data on the commercial benefits to employers of industry training. This is not the case.

To counter this, a number of ITOs have analysed the costs and benefits of training in their industries. Several ITOs have undertaken research on the costs and benefits of industry training. Overall, these studies have found that there are distinct phases in which an apprentice or trainee begins to contribute to a business.[2] This contribution can be financial and non-financial, and some ITOs have been able to measure changes in productivity due to industry training.[3] In addition, some businesses have willingly agreed to provide case study information on the benefits gained from new practises like competitive manufacturing, which requires targeted training.

The most consistent set of information comes from the industry analyses carried out by Agricultural Services Limited (ASL). The industries where they found difficulty in obtaining quantitative measures of costs and benefits were the services industries.

In the service sector, research was completed by ASL with businesses that engage in industry training with the Hospitality Standards Institute (HSI). Here, the observable behaviour of employees was again used as a measure to attempt to determine a cost benefit ratio to calculate the financial benefits from training.

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[2] See for example, NZIER. Making the most of a HITO apprenticeship. Wellington: 2010; NZIER. Return on investment from MITO apprenticeship training in New Zealand. Wellington: 2009; ASL. Identifying and Reporting the Value-Added From Training: Horticulture Sector. Palmerston North: 2010; ASL. Identifying and Reporting the Value-Added From Training: Extractives Sector. Palmerston North: 2010; ASL. Identifying and Reporting the Value-Added From Training: Services Sector. Palmerston North: 2010; AgITO. Reporting the Value-Added by Agricultural Training. Wellington: 2007;

[3] See for example, ASL. Identifying and Reporting the Value-Added From Training: Horticulture Sector. Palmerston North: 2010; NZIER. Making the most of a HITO apprenticeship. Wellington: 2010.

However, service measurement concepts were difficult to measure as most establishments do not measure labour productivity or changes in performance after training. ASL therefore derived number measures from individual establishment owners' and managers' knowledge of their businesses. But this varied markedly across the sector due to the differing operating environments. This illustrates the difficulties of using this methodology in a service environment; there is no identifiable tangible product to measure or count as a result of the change in skills arising from training.

A case study approach was therefore used to provide a 'taste' of values that were gained in individual situations, but it was not possible to provide an estimate for the sector as a whole. Owners and managers were interviewed to identify the training that was important in the performance of the service, issues that affected the response to training and to understand the industry, key performance indicators, and the management view of training. The interviews covered two levels of training, the National Certificate in Hospitality (Food and Beverage Service) (level 2 and/or level 3), and the National Certificate in Hospitality (Operations Supervision) (level 4). [4]

Overall, interviews completed in the service sector highlighted that after undertaking industry training, and often during the training process, employers noticed greater levels of professionalism among their staff, and, as a result, improvements in client outcomes and higher levels of quality assurance. These improvements are not as readily quantified as financial gains as in businesses producing goods. We now discuss these benefits in goods-producing businesses.

3.2 Benefits to employers from Role Productivity training

The information from the industry surveys and analyses carried out by ASL have identified and reported on the value added to a business from undertaking a range of different types of Role Productivity training. (The costs for this range of training was shown in Table 2.2 above). The financial benefits recorded from the surveys in businesses in eight primary industries are shown in Table 3.1.

The table shows some useful information about the employing businesses' financial benefits from training. Recall that most of the costs of training, including 'in kind' costs were of the order of $2,500 to $5,500 per trainee per year. The benefits shown are relatively low for roles which require quite a range of skills to be learnt, and applied in a multi-tasked role as

[4] Agriculture Services Limited. Identifying and Reporting the Value-added from Training: Services Sector. Palmerston North. June 2010.

on dairy farms and sheep farms. The same applies to the vine-work in kiwifruit orchards and the work in grape vineyards.

Table 3.1 Financial benefits to businesses from Role Productivity training

Employers' business	Notes	Benefit to Business
Skills		*$ per Trained staff per year*
Dairy farms		
All required skills		$8,332
Sheep and beef farms		
All required skills		$17,400
Pipfruit orchards	*$ gain / hectare*	
Pruning	$11,981 /ha	
Thinning	$7,640 /ha	
Hravesting	$8,145 /ha	
All required skills		$59,873
Kiwifruit orchards		
Vine-work	$7,750 /ha	$22,475
Leading-hand	$3,500 /ha	$87,500
Grape vineyards		
Pruning	$1,239 /ha	
Canopy managing	$1,416 /ha	
Pest and disease	$79 /ha	
Harvesting	$1,344 /ha	
All required skills	$4,078 /ha	$31,811
Pork farms	**Notes**	
Breeding units	(Mid-range)	$43,800
Grower units	(Mid-range)	$39,163
Seafood		
New crew: sea-processing		n.a.
Reduce product downgrade		$115,200
Shore factory 6mth training		$133,262
Quarries		
Processing plant	After 1 year	*$6,500 (1)*
	Year 4	*$78,000 (1)*
Movable plant	After 1 year	*$21,450 (1)*
	Year 4	*$32,500 (1)*

Sources: ITO studies, Industry interviews, BERL

Notes: (1) Estimated from the reported BCR.

The benefits of training one person (such as a leading hand in a kiwifruit orchard) can positively influence the productivity of a group of workers, with there being four times the benefits as from a leading hand compared to each vine-hand.

The ability to generate significant benefits from focussed training to increase the value per unit in high-throughput roles is illustrated in the seafood processing where training to reduce product downgrade can generate benefits of $115,000 per trainee from relatively low-skilled staff.

The information from the quarries illustrates the limited benefits in the early stage of training in the processing plant but significant benefits per year in Year 4 and thereafter.

As we noted in the section on costs of Role Productivity training, there is specific financial benefit to employees from this type of training where there is an element of performance pay in their remuneration package, or if productivity is recognised in their basic remuneration salary level. However, for most of this training, there are significant benefits to the business, and consequently most employers recognise this fact and cover the costs of industry training.

3.3 Benefits to employers from Occupation and Trades training

The benefits from Occupation and Trades training accrue to the employer in the longer run as the trained employees contribute margins towards the overheads and profits of the companies. In the early days of training, however, many employers told us that they make nothing out of the training. Consequently it is very important to work with trainees, motivate them, and ensure that they 'go the distance' and carry on to work for some years for the business which trained them.

We have modelled the benefits to the business using the same model as we used to show the costs of Occupation and Trades training. The financial benefits measured are the gross margins or 'multipliers' charged on the hourly rates on the time worked by the trainees and later the trained staff. These benefits are shown in Table 3.2 for trainees during their early years of training and immediately after completing training. Recall that the costs of training in the early years are estimated at about $15,000 per trainee per year. The benefits shown in the table of just $16,400 per trainee per year confirm the comments from employers that in early years the trainees contribute little to overheads, let alone profit.

Once the employee is trained, their hourly rate increases, and the margin the business can charge on their work also increases so that they can in, say Year 6, contribute around $57,000 per employee to the overheads and profit of the business. Over the first eight years the accumulated gross margin is estimated at about $330,000 per trainee. Given that the

accumulated training cost over the same period was estimated at $75,000 per trainee, this indicates that if a trainee stays for at least eight years then the business will receive some return for the training and experience given to the trained employee.

It is partly for this reason that employees are willing to pay the substantial training costs for those employees who show an application to study and learn. It is also one of the reasons why employers take an interest in ensuring that their employees become a valued part of their team.

Table 3.2 Financial benefits to business from Occupation and Trades training

Occupation and Trades training	Benefit to the business
	$ per Trained staff
Margins to the business	
Average gross margins per year, training Years 1 to 3	$16,400 *(1)*
Gross margins per year when trained, e.g. Year 6	$57,400
Accumulated gross margins Years 1 to 8	$335,712 *(2)*

Sources: ITO studies, Industry interviews, BERL

Notes: (1) These are the margins earned on trainee time charged out, and can contribute to training costs, business overhead costs and profits.

(2) Accumulated margin contributions to overheads and profits per year accumulated for the first eight years including training and then trained employment.

A later section will show the net training benefit and the Benefit Cost Ratio (BCR) of Occupation and Trades training compared with other industry training.

3.4 Benefits to employees

Employees receive a wide range and number of benefits from industry training, both from the on-the-job element, and the external learning and qualifications elements.

Companies can impart the skills needed and used through on-the-job training. The employees can then obtain assistance from the ITO to study the relevant theory and wider practical applications of these skills. This process is structured by the Unit Standards, which provide the employee with further skills and knowledge.

Since the skills, knowledge, and work experience are verified by national qualifications, they are portable. The employee can then aspire to higher levels of work with the present employer or elsewhere in the industry.

The operation of industry training, and the recognition of skills, knowledge and experience with qualifications allows, facilitates, and encourages employees to embark on a career path. It provides employees with personal benefits of increased income and increased work satisfaction. The previous section has shown considerable financial benefits to employers from training, and the operation of the labour market can be expected to result in those trained employees being able to attract a part of the financial benefit to themselves in terms of an increased income from the present, or another employer.

The industry training and recognised qualifications enable the operation of an effective labour market. This is to the benefit of employers and the national economy, and also provides opportunities to the individual employee.

The benefit to employees from Role Productivity training comes in the form of an increase in income and greater job satisfaction. Being more productive as a consequence of training, they are likely to earn an increased income from that employer. However they do not necessarily have a set of skills that will ensure they have a lifetime occupation. This also implies that should the business or industry they are in suffer a downturn their skills will not necessarily obtain them work in another industry. The skills and qualifications provide limited protection from future unemployment, and so the benefits to these employees are not as great as those who undertake Occupation and Trades training to achieve a significant qualification.

The magnitude and range of benefits to the trainee who completes Occupation and Trades training are very significant.

One way to indicate the financial value to the employee of training is to generate an estimate of the present value of the stream of income during their working lifetime. For this indicative analysis we take the simplifying assumptions of a working lifetime of 50 years and a discount rate to give the present value of future incomes of 6% (the trend 10 year bond rate). Information from industry used in our training model of costs and benefits for Occupation and Trades training indicates that the initial level of income is $26,000 per year, and by year 4 after the initial training period is $35,400 per year. We have assumed that an employee not completing training would achieve that income level by Year 8, and stay at that level for the remainder of the fifty year working life.

The employee completing training will increase income from $35,400 in year 4 to $62,400 by year 10, and continue at that level for the remainder of the fifty year working life.

Using these assumptions the present values of the fifty years of income flows are as follows:

Present value of 50-year lifetime income:

- Employee without Trades training: $522,000
- Employee a trained, experienced Tradesperson: $841,000

This analysis of the relative benefits shows clearly that there is a strong incentive in terms of lifetime income alone, for employees to undertake Occupation and Trades training.

Other benefits in terms of portability of the skills and qualification, and therefore the opportunities to change industry of employment, and to avoid unemployment during the working lifetime are additional economic benefits.

This estimate of the present value of relative lifetime incomes is a simple form of analysis of the value of human capital for each career path, and human capital is an important resource to contribute to the national economy. It is clear that the employee does not receive all of the income benefit, as in the first instance the nation, through government, receives the income tax stream from these incomes.

Both take-home-pay and income tax contribute to the nation's GDP, and so these estimates are a good indication of the relative contribution to national GDP of $841,000 for careers with Occupation and Trades training and qualifications, and $522,000 for work careers without Occupation and Trades training.

3.5 Training net benefits and benefit cost ratio

The analyses of training costs and training benefits to employers and employees leads to summarising the net benefits from training and the Benefit Cost Ratios (BCRs) of training. In order to provide the full context, we show the training costs, the benefits to the business, the net training benefits and the BCRs on a single table covering the industries described in our sections on Role Productivity training, and Occupation and Trades training.

Looking first at the net training benefits per year per trained staff member, the quantum differences are great, ranging from the marginal $1,400 for a first year Occupation and Trades trainee to nearly $125,000 per year for a shore factory worker in the seafood industry.

As to be expected in situations where training is undertaken over a number of years, the net training benefits in later years are much greater than in early years. In kiwifruit orchards the more-trained leading hand generates four times the benefits of a vine-worker. There is an

even more extreme difference in the quarry processing plant, and the Occupation and Trades training.

These observed differences in the quantum of net benefits are also highlighted in the value for money from training, or the BCRs from different training. At the low end of the scale was skills gained from foundation training, namely $2.00 per $1.00 spent on training costs for first-year employees in a quarry processing plant, and $4.70 per $1.00 spent on training costs for three weeks pre-season training for a 'green' crew on a new fishing boat that is processing at sea.

Table 3.3 Net training benefits and Benefit Cost Ratios for training

Employers' business	Notes	Benefit to Business	Training cost	Net training benefits		Benefit/Cost ratio
Skills		*$ per Trained staff*	*$ per Trained staff*	*$ per Trained staff*	*Per Train-ing $*	*BCR*
Dairy farms						
All required skills		$8,332	$2,452	$5,880	$2.40	3.40 : 1
Sheep and beef farms						
All required skills		$17,400	$3,505	$13,895	$3.96	4.96 : 1
Pipfruit orchards						
All required skills		$59,873	$5,580	$54,293	$9.73	10.73 : 1
Kiwifruit orchards						
Vine-work		$22,475	$5,580	$16,895	$3.03	4.03 : 1
Leading-hand		$87,500	$5,580	$81,920	$14.68	15.68 : 1
Grape vineyards						
All required skills		$31,811	$5,580	$26,231	$4.70	5.70 : 1
Pork farms						
Breeding units	(Mid-range)	$43,800	$5,008	$38,792	$7.75	8.75 : 1
Grower units	(Mid-range)	$39,163	$5,008	$34,155	$6.82	7.82 : 1
Seafood						
New crew: sea-processing			*n.a.*			4.67 : 1
Reduce product downgrade	Marginal cost	$115,200	*$2,743* (1)	$112,457	$41.00	42.00 : 1
	Hourly rate cost	*$115,200*	*$42,667* (2)	*$72,533*	*$1.70*	*2.70 :1*
Shore factory 6mth training	160hrs/trainee	$133,262	$8,400	$124,862	$14.86	15.86 : 1
Quarries						
Processing plant	After 1 year	*$6,500* (1)	$3,250	$3,250	$1.00	2.00 : 1
	Year 4	*$78,000* (1)	$3,250	$74,750	$23.00	24.00 : 1
Movable plant	After 1 year	*$21,450* (1)	$3,250	$18,200	$5.60	6.60 : 1
	Year 4	*$32,500* (1)	$3,250	$29,250	$9.00	10.00 : 1
Occupation and Trades training						
For example Tradespeople	Average Yr1-3	$16,400	$15,000	$1,400	$0.09	1.09 :1
Tradespeople	Trained Year 6	$57,400	$5,000	$52,400	$10.48	11.48 :1
Tradespeople	*Accumulated Yr1-8*	*$335,712* (3)	*$75,000*	*$260,712*	*$3.48*	*4.48 :1*

Sources: ITO studies, Industry interviews, BERL *Notes:* *(1) Estimated from the reported BCR.*

(2) Actual costs are much lower as 250 hours training is by internal staff at low demand times: No training provider costs, no wage cost for trainee staff time.

(3) Accumulated Margin contributions to overheads and profits per year accumulated for the first eight years of training and then trained employment.

Some other aspects of the financial benefits from different types of training are illustrated in this data. For example, where there is a broad range of skills requiring training, as on dairy farms and sheep and beef farms, the benefit/cost ratios are relatively low, at 3.4:1 to 5:1.

Where training is focused to achieve specific better outcomes from employees, the BCR can be very high. The training to reduce downgraded seafood product had a BCR of 42:1. Training of supervisors who can improve the productivity of a number of production staff has a higher BCR than the training of the production staff. In kiwifruit orchards, training given to leading hands had a BCR of 15:1, whereas training vine workers had a BCR of 4:1.

A similar effect is shown where training continues for a number of years, and the BCR in later years is greater than for the early years. This effect was particularly large in quarry processing plants where training in year one had a BCR of 2:1, and that increased to 24:1 for the training given in year four to achieve a fully-trained staff member. Presumably thereafter, with some low level of maintenance training, the annual benefit (estimate at $78,000 per trained employee) will accrue to the business.

The other significant example is the Occupation and Trades training where the BCR in the first three years is little above 1:1, and by the sixth year is about 11.5:1. The longer term accumulated benefits over accumulated costs is about 4.5:1, which is in a similar range to many of the other forms of training shown on the table.

The matter of the ongoing stream of annual benefits from training is not specifically clarified in the studies of the BCRs, but we have shown in our analysis of the lifetime benefit to the employee from Occupation and Trades training, that the difference in these income streams can be very large indeed. These Net Present Values (NPVs) of the stream into the future of the costs and benefits of training reflect the benefit to the private stakeholders, and also to the nation's GDP.

The principal argument which forms the basis of these analyses is that the behaviour of the employee changed as a result of training and that this resulted in an improved financial return to their employer.[5] In addition, these studies found that employers tended to be very satisfied with the training offered in their industry and believed it provided good value at an industry and individual business level. In some studies the employees also were surveyed and showed a high level of satisfaction with their benefits from the industry training.

In the service sector, research was completed by ASL with businesses that engage in industry training with the Hospitality Standards Institute (HSI). Here, the observable

[5] ASL. *Identifying and Reporting the Value-Added from Training: Horticulture Sector*. Palmerston North: 2010.

behaviour of employees was again used as a measure to determine a cost benefit ratio to calculate the financial benefits from training.

However, service measurement concepts were difficult to measure as most establishments do not measure labour productivity or changes in performance after training. A case study approach was therefore used to provide a 'taste' of values that were gained in individual situations but it was not possible to provide an estimate for the sector as a whole.

Overall, interviews completed in the service sector highlighted that after undertaking industry training, and often during the training process, employers noticed greater levels of professionalism among their staff, and as a result improvements in client outcomes and higher levels of quality assurance.

As representatives of industry, ITOs understand how industry 'works' and how training can be made part of this work environment. This is a unique feature of industry training that again emphasises the conduit role that ITOs play in tertiary education and the labour market.

To meet the needs of apprentices and trainees, employers, and industry, ITOs arrange the delivery of training in the workplace and at training providers. This section has focused on how ITOs arrange this delivery. In particular we have discussed what industry training

3.6 Benefits to industry of undertaking training

The benefits measured and described for individual businesses show a high level of benefit to the business for each $1.00 spent on training. The benefits to the overall industry will also be significant especially where the training lifts the quality of the goods and services produced across the industry in question. Where customers and clients can be confident of a high level of quality from all businesses in an industry, whether those businesses are producing lambs, kiwifruit, a water-tight home, or a restaurant dinner or a well-serviced hotel room, then all businesses in the industry will benefit from receiving higher prices for their goods and services.

Another industry benefit is that the businesses in the industry can with confidence embark on expansion programmes in the knowledge that as they require more staff there will be at least some trained staff available. The industry as a whole will therefore have a higher level of resilience than otherwise.

The industries show their recognition of these benefits by industry leaders and industry organisations showing a keenness to participate in the various steering bodies for the ITOs, and specific roles in delivering industry training.

3.7 Benefits to the national economy of industry training

The main driver of increases in the goods and services elements of the standard of living of people in a national economy is the labour productivity in the economy. In plain language this is the amount, or value of goods and services produced by each person in the national economy.

The amount of goods and services produced, or the productivity of each employed person is dependent upon two main factors: the resources and capital equipment available to them, and the individual skills of the person. By obtaining more skills, the employed person can produce a higher value of goods and services using their available resources and capital equipment.

This illustrates why the skills and experience of people is often referred to as human capital. It can be used as a substitute in some cases for more capital equipment used in production.

New Zealand's national economy has relatively constrained amounts of capital available for the employed in the economy, and so the level of skills which each employed person has will have a strong impact on the goods and services elements of New Zealanders' standard of living. This provides the main rationale for the national government to provide significant resource to encourage and provide industry training to increase the skills and experience in the employed population.

We can model the impact on the standard of living, as measured by New Zealand's GDP if the resource applied to industry training in future is changed according to specific scenarios. The modelling and the impacts are described in the next section of this report.

4 Measuring future national training benefits

In the following section of our report we explore the impact of different assumptions regarding the development of industry training using the BERL computable general equilibrium (CGE) model. These assumptions form the basis of different scenarios for the New Zealand economy generated by the CGE model.

The scenarios are compared to a 'baseline' or 'business-as-usual' (BAU) projection for the New Zealand economy; i.e. the difference between the scenarios and the BAU will illustrate the impact of the assumed development of industry training. The model measures a range of economic indicators, including employment, output (or production, or sales), and exports by 53 industries; as well as employment, Gross Domestic Product (GDP), and exports at the macro aggregate level, and the trade balance and government balance.

Short and long-term impacts are explored by the model experiments, with the change in industry training assumed to be imposed in 2012. The effect on the economy for 2014 is considered the short-term impact, while the longer-term impact is for the 2021 year.

Overall, using the CGE model to explore various industry training scenarios highlights the significant contribution that industry training makes to the New Zealand economy.

4.1 Scenarios

Recently, industry training completions have averaged about 39,000 people per year. About 70 percent of this training is funded by the public sector, with industry funding the remaining 30 percent.

4.1.1 Decrease in public and private investment in industry training scenarios

Thus, the loss of public sector funded industry training would see annual completions decline by about 27,000, the equivalent of approximately 1.3 percent of the employed labour force. If industry spending is also eliminated except for selected sectors that are subject to regulatory training requirements (or have a history/culture of training), annual completions would decline by over 37,000, the equivalent of approximately 1.7 percent of the employed labour force.

The scenarios explored are as listed in Table 4.1.

Table 4.1 Descriptions for reduced industry training scenarios

Label	Description
D0	public investment in industry training is reduced to 0 per annum from 2012.
D1	public investment in industry training is reduced to 0 per annum from 2012; and private industry contribution declines, but remains above zero in selected industries.
D2	public investment in industry training is reduced to 0 from 2012, with the $156m per annum transferred to other spending within the tertiary education sector; and private industry contribution declines, but remains above zero in selected industries.
D3	public investment in industry training is reduced to 0 from 2012, with the $156m per annum transferred to other spending in the public sector; and private industry contribution declines, but remains above zero in selected industries.

The selected industries where a portion of industry spending is assumed to remain due to regulatory requirements (or a history/culture of training) are:

- Building and Construction ITO
- Electricity Supply ITO
- Electrotechnology ITO
- Hairdressing ITO
- Motor ITO
- Plumbing, Gasfitting, Drainlaying and Roofing ITO.

4.1.2 Increase in public and private investment in industry training scenarios

Scenarios explored involving an increase in the level of industry training as listed in Table 4.2.

Table 4.2 Descriptions for increased industry training scenarios

Label	Description
I1	public investment in industry training is increased by $55m per annum from 2012, coupled with a similar $ reduction in other public investment spending; the increased spending is allocated across industries in proportion to that in the baseline BAU; private investment in industry training increases by a similar percentage.
I2	public investment in industry training is increased by $55m per annum from 2012, coupled with a similar $ reduction in other public investment spending; the increased spending is allocated across specific industries based on their export intensity reflecting the Government's Economic Growth Agenda (EGA) goals; private investment in industry training increases by a similar percentage.
I3	public investment in industry training is increased by $55m per annum from 2012, coupled with a similar $ reduction in other public investment spending; the increased spending is allocated across specific industries based on the demographic profile of the industry labour force consistent with the Tertiary Education Strategy goals, modified to incorporate the training needs for the Christchurch rebuild; private investment in industry training increases by a similar percentage.
P1	private investment in industry training is increased by $55m per annum from 2012, coupled with a similar $ reduction in other private sector investment spending; the increased spending is allocated across industries in proportion to that in the baseline BAU.

In relation to scenario I2, the industries selected on the basis of their export intensity are:

- Agriculture ITO
- Apparel & Textile ITO
- Aviation, Tourism & Travel ITO
- NZ Marine
- Competenz
- EXITO
- FITEC
- Horticulture ITO
- NZITO
- Plastics ITO
- CMITO
- Seafood ITO.

In relation to scenario I3, the industries selected on the basis of the TES goals, modified to incorporate the training needs for the Christchurch rebuild are:

- Building and Construction ITO
- Competenz
- Electricity Supply ITO
- Electrotechnology ITO
- FloorNZ
- FITEC
- Hairdressing ITO
- Infratrain
- Joinery ITO
- Motor ITO
- Opportunity Training
- Decorate NZ
- Plastics ITO
- CMITO
- Plumbing, Gasfitting, Drainlaying and Roofing ITO.

4.2 Results

The modelling results of the various industry training scenarios highlight the significant contribution that industry training makes to the New Zealand economy.

4.2.1 Reduction in the level of industry training

At the headline level, the loss of all public sector funding for industry training results in a short-term loss in GDP of between 0.6 percent and 1.8 percent, compared to the level of GDP reached in the baseline BAU situation. Over the longer term, the loss in GDP rises to between 2.9 percent and 6 percent.

In constant 2010$ terms, the short-term losses in GDP equate to between $1.2 billion to $3.7 billion annually. Over the longer term, these losses rise to between $7.2 billion to $15.1 billion.

The impact varies over these ranges depending on the response of the industry itself to the reduction in public sector funding. The largest loss is experienced in the situation where industry spending on industry training also declines (except in some selected industries), equivalent to scenarios D1 and D3. The least loss occurs in the situation where the public funds are transferred to other spending within the tertiary sector (scenario D2). Scenario D0, where industry spending on industry training remains at the baseline BAU level yields a loss towards the middle of the range.

Table 4.3 Macro impact of reductions in industry training

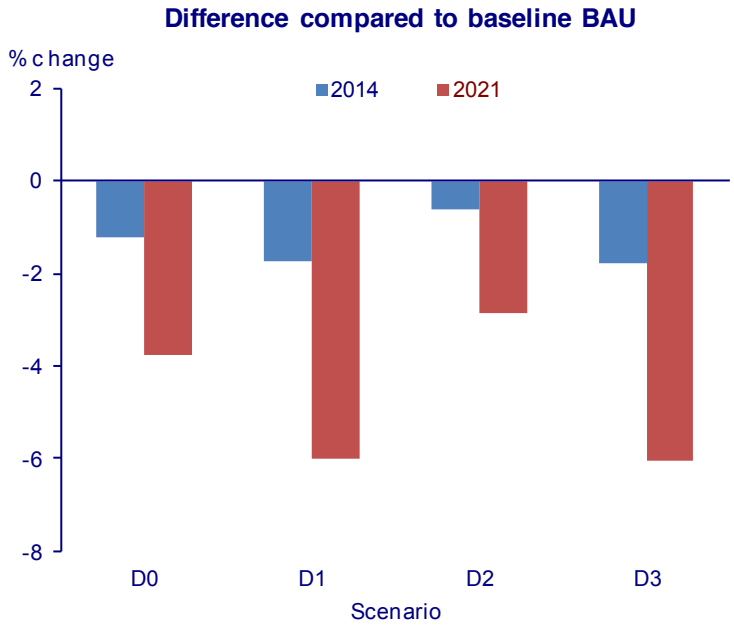
	2014			
	D0	D1	D2	D3
% change on baseline BAU				
GDP (2010 $m)	-1.2	-1.7	-0.6	-1.8
GDP per capita (2010 $)	-1.2	-1.7	-0.6	-1.8
Consumption	0.1	0.2	0.1	0.3
Investment	-1.8	-1.8	-1.6	-1.8
Exports	-3.0	-4.9	-1.3	-5.3
Factor cost GDP	-1.3	-1.9	-0.7	-1.9
Trade balance ($m change as % of	-0.5	-0.9	-0.1	-1.0
Employment	-2.4	-3.3	-1.3	-3.3
Real wage rates	2.1	3.1	1.2	3.1

In particular, it is clear that the scenario where public sector industry training funds are transferred to other components of the tertiary education sector (scenario D2), there is still a net negative impact to the economy. And this impact is over both the short and the longer term.

The negative result for scenario D2 arises because of two influences. Firstly, the transfer to other parts of the tertiary education sector still results in a net reduction in the number of completions/graduates – given the relatively higher per-EFTS costs for other forms of training. This reduction in completions/graduates reduces the quantum of skilled or trained labour available and, consequently, impacts on industry and businesses' capacity and production. Secondly, the reduction in public funded industry training is accompanied by a reduction in private sector industry funds available for industry training. As noted above in

the scenario descriptions, we retain industry funded training in specific industries. However, in other sectors the private industry response will add further to the reduction in industry training and so to the negative impact.

Figure 4.1 Impact on GDP of reductions in industry training



It is also clear that the composition of the loss in GDP is very heavily dominated by the impacts on the export sector. In the short term, the loss in total export volumes ranges from 1.3 percent to 5.3 percent, compared to the baseline BAU level of exports. These losses in exports rise to between 8 percent and 19 percent over the longer term.

The greater impact on exports arises from a combination of both labour supply and cost effects. That is, the reduction in the availability of trained labour impacts not only the capacity of sectors to produce output or deliver services. Over the long term this supply constraint results in a relative increase in the cost of skilled and trained labour as industries compete for the reduced pool of talent. The increased cost of trained labour impacts heavily on the competitiveness of the export sector. Consequently, their reduced cost-competitiveness is translated directly to a reduction in export sales, as New Zealand producers lose out to other suppliers on the global market place.

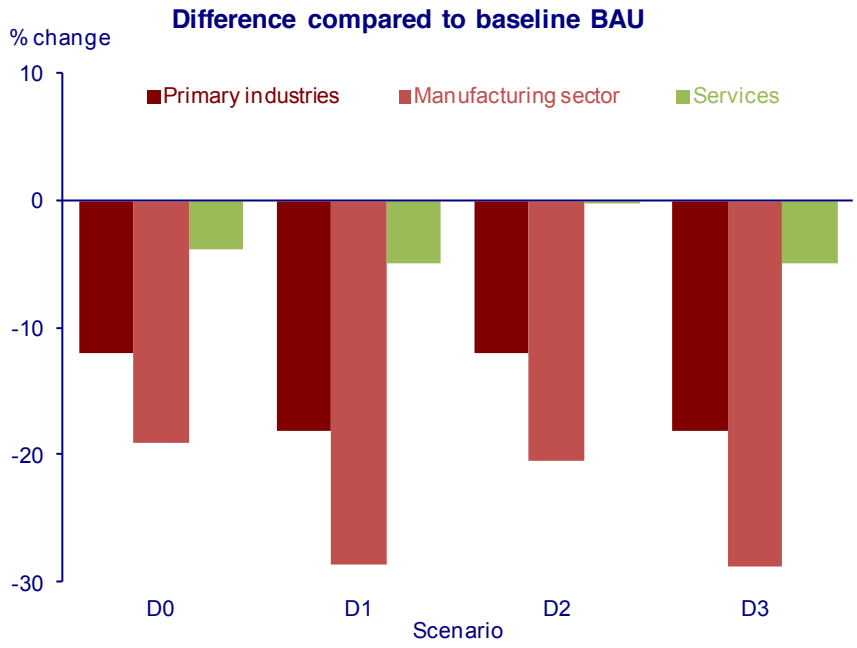
This picture is confirmed by the impact on employment at the industry level, where primary industries and manufacturing sectors are the hardest hit by the reduction in industry training. As depicted in Figure 4.2, the long-term impact on the manufacturing sector is substantial.

The detail within the manufacturing sector shows large impacts in the machinery and other equipment manufacturing, as well as in the food and wood processing sectors. Of course,

many export-oriented businesses lie within these components of the manufacturing sector. However, the impacts on all other sub-sectors within manufacturing are also heavily negative.

Within the primary industries, the greatest impact of reduced training is recorded in the forestry sector. The impact on other primary industries, however, remains large. Amongst the services, the building and construction sector experiences the greatest impact.

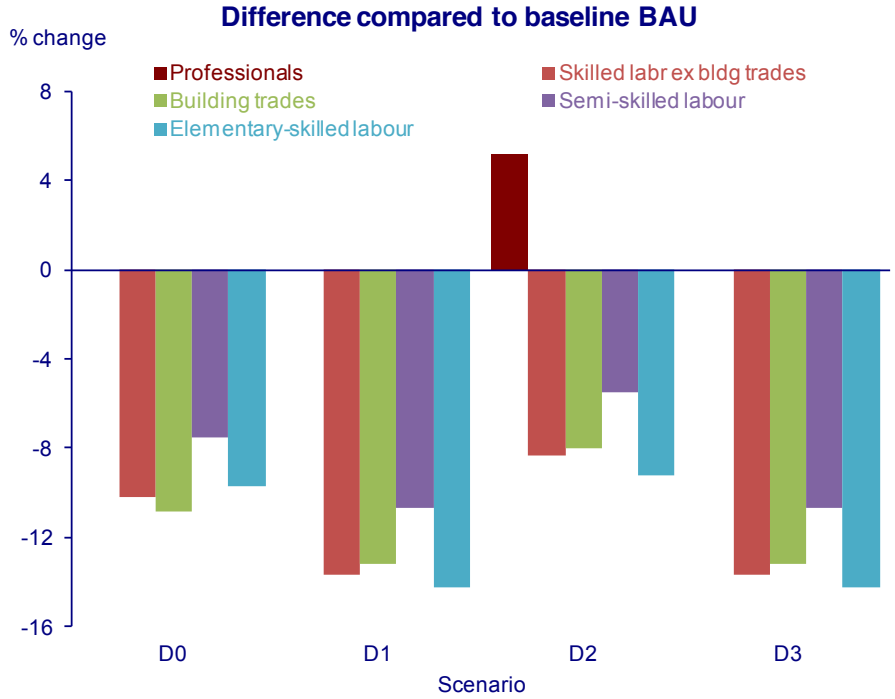
Figure 4.2 Impact in 2021 on industry employment



The reduced training has an expected negative impact on employment across most occupation categories. Employment in the professional occupations remains unchanged in the scenarios, in line with the reductions in industry training affecting the non-professional categories. As illustrated in Figure 4.3, the impacts by occupation are spread across most other categories. Not surprisingly, the skilled labour and building trades categories experience sizable losses.

Interestingly, the categories we label 'elementary skilled' also experience large negative losses. These are due, in particular, to the significant training undertaken for industrial plant and machinery operators. This training currently falls (in varying proportions) under the auspices of the NZITO, Plastics ITO, Printing ITO, Seafood ITO, Infratrain, FITEC and EXITO. This result reaffirms earlier findings that the economy needs labour across the whole range of skill categories. Further, the development of productive techniques in these industries means that the training requirements for these relatively 'elementary' occupation categories become more critical.

Figure 4.3 Impact in 2021 on employment by occupation



The least affected categories are those we have labelled as 'semi-skilled'. This category involves office and customer service clerical occupations. While negatively impacted, these categories currently comprise relatively less of the nation's industry training effort and so are less affected in these scenarios.

4.2.2 Increase in the level of industry training

The scenarios where we assume increases in the level of industry training yield positive impacts on GDP and exports and other main economic indicators. The impact on GDP ranges from 0.5 percent to 0.7 percent over both the short and longer term compared to the baseline BAU level of GDP.

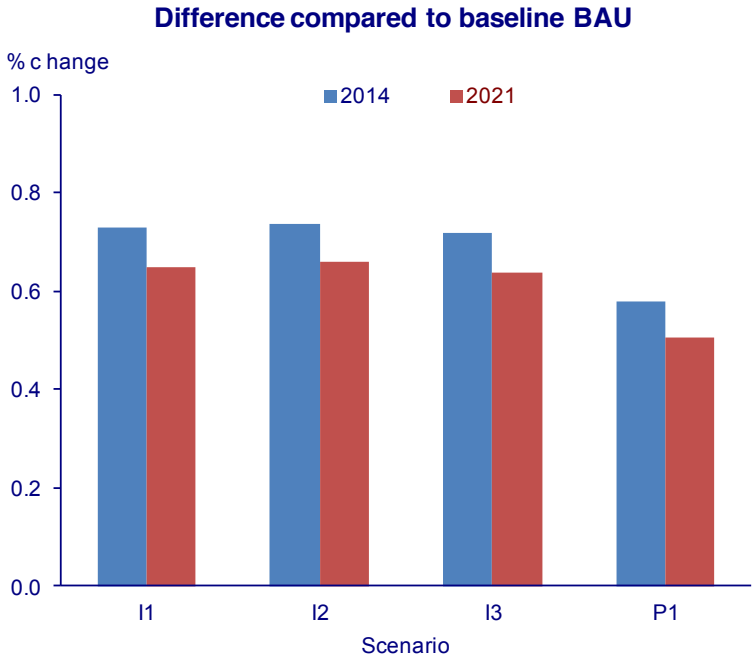
Table 4.4 Macro impact of increases in industry training

	2021			
	I1	I2	I3	P1
% change on baseline BAU				
GDP (2010 $m)	0.6	0.7	0.6	0.5
GDP per capita (2010 $)	0.6	0.7	0.6	0.5
Consumption	-0.1	-0.1	-0.1	-0.3
Investment	0.6	0.4	0.7	-0.2
Exports	2.0	2.1	1.8	2.1
Factor cost GDP	0.7	0.7	0.7	0.6
Trade balance ($m change as % of	0.4	0.3	0.4	0.5
Employment	1.4	1.4	1.4	1.4
Real wage rates	-1.3	-1.2	-1.1	-1.5

The relatively small gain (when compared to the magnitude of the losses discussed above) arises primarily from the overall labour supply constraint. Our scenarios assume no change in population, labour force participation or migration. Consequently, as industry training increases the available pool of trained and skilled labour, we begin to approach a full employment situation.

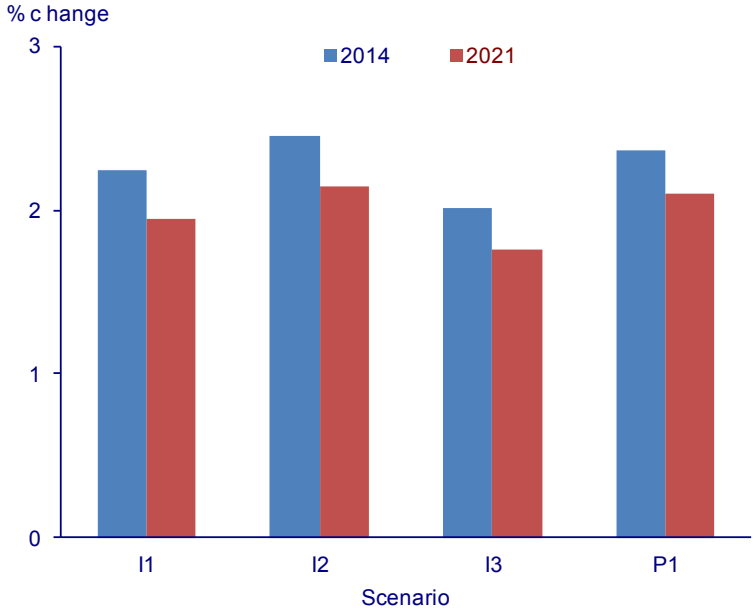
At the headline level there are essentially only marginal differences between the scenarios. A focus on training in export-intensive industries (scenario I2) provides little extra gain. Similarly, a focus on TES goals and the Christchurch re-build (scenario I3) also yields little difference to scenario I1, which increases industry training in line with the current composition of industry training. This again reinforces the earlier comments regarding the importance to the economy of all occupation and skill types.

Figure 4.4 Impact on GDP of increases in industry training



While the gains are relatively small, they are noticeable. Again, the largest gains are enjoyed by the export sector, where the quantum of skill and trained labour increases their capacity. In addition, the increased availability of trained labour reduces its relative cost, thereby improving the cost competiveness of New Zealand exports on the global market.

Figure 4.5 Impact on export volumes of increases in industry training



4.3 The rationale for public investment in industry training

The New Zealand economy is relatively constrained in terms of the amount of capital it has available. This means the skill levels of employed people will positively impact on the quality and value of the goods and services produced, and the standard of living in New Zealand. Industry training contributes to the development of these skills. However, the market for industry training exhibits imperfections, in particular relating to information asymmetry. This provides a strong rationale for public sector investment in industry training.

Subsequently, a focus on short-term return on investment or direct value for money is not appropriate as it does not acknowledge this market failure. If the market mechanism fails, and resources are not efficiently allocated, then in the case of industry training the skills demanded by the labour market and the economy will not be matched by the supply of new entrants.

ITOs rectify this potential for market failure by minimising the impact of information asymmetry. They do this through the development of national qualifications and the standards required to achieve these qualifications; through the arrangement of industry training in a classroom, in a workplace, or in a combination of these locations; and through their leadership on skill and training matters, particularly in regards to identifying current and future skill needs, and their work with employees, employers and industry to meet these needs.

ITOs also reduce transaction costs through arranging the delivering of industry training, and through their development of national qualifications that meet industry standards and labour market needs. A reduction in variety, through the development of national qualifications, can lower costs as employers and employees know what to expect from industry training and the quality of the output. Gaining a nationally recognised qualification may decrease frictional unemployment and lower costs as employees spent less time explaining what their skills, training and qualifications are to prospective employers, and employers are able to successfully recruit skilled, trained staff.

Observations made through the use of the BERL computable general equilibrium model have highlighted the significant contribution that industry training makes to the New Zealand economy; but, they have also illustrated that an economy is a complex system. Any attempts to prioritise or isolate particular industries, sectors, occupations or skills as being more or less important are economically unsound.

Industry training in New Zealand is learner-centred training that responds to the needs of employers and industry. Individuals are motivated to enter industry training by its relevance, particularly the attainment of a national qualification. Employers are influenced to engage in

industry training due to the productivity improvements gained by their employees, and their business, through training. This type of training involves practical application and theory, and is competency-based. It is imperative to acknowledge this complexity, not only in terms of how learning takes place, but in terms of the broad range of skills, occupations, sectors and industries that industry training encompasses.

5 Summary of findings

Overall, this report provides qualitative and quantitative information on the process of arranging and delivering industry training, establishing recognised national qualifications for different levels of skill and experience, and the leadership required to ensure that future industry skill needs will be available or addressed. Throughout, we draw on data and information provided in interviews with ITOs, industry representatives, training and Modern Apprenticeship Co-ordinators, and employers. We also refer to official data sources, BERL databases, and information and data provided by the ITOs.

In recent years the officially recorded total cash funding cost of industry training has been of an order of magnitude of about $300 million per year. Of this sum approximately 70 percent has been provided by government and 30 percent by industry. Industry, employers and employees also provide additional cash for training-related costs, and additional 'in kind' resources particularly time for training and related functions. The number of employees in industry training arranged through the ITOs in recent years has been as high as 133,000, in 2008, but has declined to 102,000 in 2010. In the years 2006 to 2009 the recorded total cash funding cost implied an average cost per trainee per year of $1,850 to $2,300 each.

Information from the industries indicate that the 'in kind' contribution from employers (and to a lesser extent employees) typically amounts to about $2,400 per trainee per year. This is a similar amount to the 'cash contributions from industry' plus the government funding contribution through TEC.

We found that Role Productivity training typically was relatively short term and cost about $3,000 to $5,000 per trainee per year. The longer-term Occupation and Trades training cost about $15,000 per trainee per year in the early two-to four-year training period. The expected incidence of benefits from Role Productivity training was mostly with the employer, and consequently they generally covered the costs.

The training costs for Occupation and Trades training over the first eight years of the trainees' careers can reach $75,000. These generated strong benefits to the employer, only if the trainee stayed with the employer for some years after the training period.

The actual benefits for these two types of training are also analysed, and the Role Productivity training is shown to often be able to generate high benefits on a short timescale. These skills and experience are however not necessarily portable to other businesses or other industries. This can impact on the employees' security of employment over time.

The benefits from Occupation and Trades training can flow to the employee for a working lifetime. The present value of a 50-year working lifetime income for a work career without occupation of trades training was shown to be $522,000. On the other hand the present value of a 50-year working lifetime income for a work career in a trained, experienced, qualified occupation or trade was shown to be $841,000. These values are also the measure of the contribution to GDP of these careers over the lifetime.

The completion of Occupation and Trades training, experience and qualification creates a highly-skilled worker with portable and valuable skills. This process results in the creation of considerable amounts of human capital which resource is one of the most valuable in the productive economy.

The analyses of the costs and the financial benefits of industry training allowed us to measure the Benefit Cost Ratio (BCR) from training expenditure. These BCRs are generally about $4.00 to $5.00 benefit per $1.00 spent on training. Early in the training process, the BCRs are as low as $1.09 to $2.00 per $1.00 spent on training.

Later in the training cycle the BCRs can be $11 to $16 to $24 per $1.00 spent on training. Finally for some very specific Role Productivity training to improve output in high-turnover roles as in seafood processing, BCRs as high as $42 of benefits per $1.00 spent on training have been measured.

The level of benefit is not always apparent to the employer and employee, especially early in the training process. However the eventual benefits are significant. If there are external benefits to the national economy from the human capital created by industry training, then there is justification for the nation to contribute to training costs to encourage a greater level of industry training than would otherwise occur.

Our experience with modelling the New Zealand economy is that at a national level, the returns to the New Zealand economy of an additional skilled person are high. The acquisition and application of improved industry relevant skills can be associated with higher productivity and are in line with increased income and superior export performance. Further, higher skills potentially provide a longer-term foundation for the application of research, innovation and market oriented industries.

We have therefore carried out specific experiments using a general equilibrium model of the New Zealand economy. These experiments modelled various industry training scenarios, and highlight the significant contribution that industry training makes to the New Zealand economy.

In particular we found that the loss of all public sector funding for industry training resulted in short-term loss in GDP of between 0.6 percent and 1.8 percent, compared with the GDP reached in the baseline BAU situation. Over the longer term, these GDP losses were 2.9 percent to 6 percent. These levels of change equate to between $1.2 billion and $3.7 billion annually, and this range is similar to the estimate of benefit from the ITO survey information.

This estimate based on the ITO BCRs is that the industry and government cash contribution is about $300 million, and 'in kind' contribution about as much again. This $600 million can be expected to generate about $4 to $5 benefit per $ spent on training. This would imply benefits of $2.4 billion to $3 billion from the training spend. This is mostly value added so is comparable with the GDP estimate from the modelling scenarios.

The impact varies depending on the response of the industry itself and the largest losses are experienced where the reduction in publicly-funded industry training is met by reductions in industry-funded training.

The loss in GDP is heavily dominated by the export sectors. These arise from both labour supply and cost effect. The reduced availability of trained labour impacts on the capacity of sectors to produce output or deliver services. Also, the reduced supply of trained labour increases the cost of trained labour, which impacts heavily on the competitiveness of the export sector, and the rest of the tradable sector. Export industries' reduced cost-competitiveness translates directly into reduced export sales, as New Zealand producers lose out to other suppliers in the global market place.

This loss of export receipts due to reduced industry training is very important to the New Zealand economy in both the short term and the longer term. In the short term, New Zealand will continue to need to obtain funds from the world financial markets, and the strength of our export economy over recent years has been crucial to maintaining our credibility and ability to borrow. In the longer term, the health of our export income is essential to ensure investment to increased economic growth and our productivity and incomes.

The modelling showed that there is economic and social justification to support training for all skill provision – vocational, trades, academic and professional. Earlier modelling by BERL did confirm that there is significant public benefit (the above-wage addition to GDP per FTE) across a range of occupation categories. An economy is a complex system. Any attempt to prioritise or isolate particular industries, sectors, occupations or activities as more important or less important envisages a simple framework. Consequently such attempts are economically unsound. A more appropriate framework acknowledges the importance of a

broad range of occupations, of skills, as well as a variety of training providers and methods of provision.

Further modelling showed that focussing an increased training effort on particular industries (e.g. export-intensive sectors, or to align to TES-goals) has no additional gain over a broad training effort. This reinforces findings that the economy needs trained labour across the whole range of occupation and skill types.

The analyses of components and incidence of costs and benefits and the Benefit Cost Ratios provide a sound description of the actual place of training, and the economic benefits of training within industry in New Zealand. These findings and the findings from macro-economic modelling of different scenarios of industry training funding and levels contained in this report, provide a sound basis for testing the rationale for public investment in industry training in New Zealand.

6 Appendix 1: Baseline (BAU) projection

The baseline or 'business as usual' projection for the New Zealand economy is generated using the following assumptions.

- this projection of the New Zealand economy to 2021 assumes ongoing rates of growth in productivity and world demand at historic averages.
- the short-term projection to 2014 is subdued, consistent with ongoing financial uncertainty restraining growth in world demand, in the wake of sovereign debt issues in the EU and US.
- over both the short and longer term, the baseline BAU incorporates announced government infrastructure spending commitments, as well as an assumed Christchurch re-building programme that begins in 2012 and continues to be a significant driver of NZ economic activity over the remainder of the projection period.
- demographic projections and neutral assumptions as to labour force participation and international migration, provide the basis for labour supply in the baseline, along with government and investment spending ratios.
- the baseline BAU assumes that no changes to industry training occur, with public investment remaining at the current $156m per annum, in real inflation-adjusted terms; and no change in private industry contribution.

7 Appendix 2: CGE modelling results tables

Table 7.1 Short-term impact of reductions in industry training

		2014				
	2010	BAU	D0	D1	D2	D3
GDP (2010 $m)	*187,302*	204,592	202,118	201,013	203,361	200,934
%pa from 2010		*2.2*	*1.9*	*1.8*	*2.1*	*1.8*
GDP per capita (2010 $)	*42,941*	45,254	44,707	44,462	44,982	44,445
%pa from 2010		*1.3*	*1.0*	*0.9*	*1.2*	*0.9*
Consumption	*109,491*	116,938	117,079	117,202	117,067	117,232
Investment	*36,398*	41,476	40,728	40,736	40,802	40,710
Exports	*52,425*	58,218	56,472	55,344	57,458	55,133
%pa from 2010		*2.7*	*1.9*	*1.4*	*2.3*	*1.3*
Factor cost GDP	*164,243*	179,562	177,265	176,227	178,388	176,160
%pa from 2010		*2.3*	*1.9*	*1.8*	*2.1*	*1.8*
Trade balance ($m)	*2,735*	3,485	2,364	1,455	3,259	1,252
Employment (000s)	*1,830*	1,918	1,872	1,854	1,894	1,854
%pa from 2010		*1.2*	*0.6*	*0.3*	*0.9*	*0.3*
Real wage rates	*100.0*	103.9	106.1	107.1	105.1	107.1
Trade balance (%GDP)	*1.46*	1.55	1.06	0.65	1.47	0.56
Govt balance (%GDP)	*-2.59*	-2.99	-3.30	-3.47	-2.92	-3.59

% change on baseline BAU

GDP (2010 $m)	-1.2	-1.7	-0.6	-1.8
GDP per capita (2010 $)	-1.2	-1.7	-0.6	-1.8
Consumption	0.1	0.2	0.1	0.3
Investment	-1.8	-1.8	-1.6	-1.8
Exports	-3.0	-4.9	-1.3	-5.3
Factor cost GDP	-1.3	-1.9	-0.7	-1.9
Trade balance ($m change as % of GDP)	-0.5	-0.9	-0.1	-1.0
Employment	-2.4	-3.3	-1.3	-3.3
Real wage rates	2.1	3.1	1.2	3.1

Table 7.2 Longer-term impacts of reductions in industry training

		2021				
	2010	BAU	D0	D1	D2	D3
GDP (2010 $m)	*187,302*	250,809	241,366	235,765	243,650	235,689
%pa from 2010		*2.7*	*2.3*	*2.1*	*2.4*	*2.1*
GDP per capita (2010 $)	*42,941*	52,467	50,492	49,320	50,970	49,304
%pa from 2010		*1.8*	*1.5*	*1.3*	*1.6*	*1.3*
Consumption	*109,491*	143,680	144,684	145,696	144,879	145,730
Investment	*36,398*	52,023	50,471	50,564	50,830	50,534
Exports	*52,425*	71,496	63,501	58,075	65,365	57,871
%pa from 2010		*2.9*	*1.8*	*0.9*	*2.0*	*0.9*
Factor cost GDP	*164,243*	220,008	211,232	206,147	213,283	206,084
%pa from 2010		*2.7*	*2.3*	*2.1*	*2.4*	*2.1*
Trade balance ($m)	*2,735*	2,485	-4,804	-10,828	-2,941	-11,068
Employment (000s)	*1,830*	2,056	1,930	1,881	1,988	1,881
%pa from 2010		*1.1*	*0.5*	*0.3*	*0.8*	*0.3*
Real wage rates	*100.0*	113.0	119.9	123.5	117.4	123.6
Trade balance (%GDP)	*1.46*	0.76	-1.48	-3.35	-0.92	-3.42
Govt balance (%GDP)	*-2.59*	-2.77	-5.64	-6.52	-4.12	-6.66

% change on baseline BAU

GDP (2010 $m)	-3.8	-6.0	-2.9	-6.0
GDP per capita (2010 $)	-3.8	-6.0	-2.9	-6.0
Consumption	0.7	1.4	0.8	1.4
Investment	-3.0	-2.8	-2.3	-2.9
Exports	-11.2	-18.8	-8.6	-19.1
Factor cost GDP	-4.0	-6.3	-3.1	-6.3
Trade balance ($m change as % of GDP)	-2.2	-4.1	-1.7	-4.2
Employment	-6.1	-8.5	-3.3	-8.5
Real wage rates	6.1	9.3	3.9	9.4

Table 7.3 Longer-term impact on employment by industry of reductions in industry training

		2021				
	2010	BAU	D0	D1	D2	D3
Employment by industry (000s)						
Agriculture	*122.3*	130.5	116.6	109.3	117.0	109.2
Other primary	*17.4*	21.2	16.9	14.9	16.5	14.9
Food and processing	*56.3*	58.3	49.8	45.3	49.0	45.2
Fabricated metal products	*60.5*	72.3	56.8	49.0	56.3	49.0
Other manufacturing	*85.5*	95.4	76.5	66.9	74.7	66.8
Building and construction	*152.1*	178.4	167.6	167.5	171.6	167.5
Trade, restaurants & hotels	*406.1*	458.4	437.2	429.7	453.5	429.5
Telecommunications	*98.5*	110.7	106.4	105.0	113.6	104.8
Finance & business servic	*262.5*	296.3	285.2	280.3	298.7	280.1
Government, educ & health	*404.6*	461.4	451.4	448.9	462.9	449.7
Other services	*164.2*	173.5	166.1	164.6	174.3	164.6
SUB-TOTALS						
Primary industries	*139.7*	151.7	133.5	124.2	133.5	124.1
Manufacturing sector	*202.3*	226.0	183.1	161.2	179.9	161.0
Services	*1,488.0*	1,678.6	1,613.9	1,596.0	1,674.5	1,596.2
TOTAL	*1,830.0*	2,056.4	1,930.5	1,881.4	1,987.9	1,881.4
% change on baseline BAU in employment by industry						
Agriculture			-10.6	-16.2	-10.4	-16.3
Other primary			-20.6	-29.8	-22.1	-29.9
Food and processing			-14.6	-22.4	-16.0	-22.5
Fabricated metal products			-21.5	-32.2	-22.2	-32.3
Other manufacturing			-19.8	-29.9	-21.7	-29.9
Building and construction			-6.0	-6.1	-3.8	-6.1
Trade, restaurants & hotels			-4.6	-6.3	-1.1	-6.3
Telecommunications			-3.9	-5.2	2.6	-5.3
Finance & business services			-3.8	-5.4	0.8	-5.4
Government, educ & health			-2.2	-2.7	0.3	-2.5
Other services			-4.3	-5.1	0.5	-5.1
SUB-TOTALS						
Primary industries			-12.0	-18.1	-12.0	-18.2
Manufacturing sector			-19.0	-28.7	-20.4	-28.8
Services			-3.9	-4.9	-0.2	-4.9
TOTAL			-6.1	-8.5	-3.3	-8.5

Table 7.4 Longer-term impact on occupations of reductions in industry training

		2021			
	2010	BAU	D0	D1	D2	D3
Employment by Occupation (000s)						
Professionals	*570.1*	640.6	640.6	640.6	673.8	640.6
Skilled labr ex bldg trades	*314.4*	344.2	309.1	297.1	315.4	297.1
Building trades	*91.9*	104.1	92.8	90.3	95.7	90.3
Semi-skilled labour	*596.4*	665.7	615.5	594.5	629.2	594.5
Elementary-skilled labour	*257.2*	301.8	272.5	258.9	273.9	258.9
TOTAL	*1,830.0*	2,056.4	1,930.5	1,881.4	1,987.9	1,881.4
% change on baseline BAU in employment by occupation						
Professionals			0.0	0.0	5.2	0.0
Skilled labr ex bldg trades			-10.2	-13.7	-8.4	-13.7
Building trades			-10.9	-13.2	-8.0	-13.2
Semi-skilled labour			-7.5	-10.7	-5.5	-10.7
Elementary-skilled labour			-9.7	-14.2	-9.3	-14.2
TOTAL			-6.1	-8.5	-3.3	-8.5

Table 7.5 Short-term impact of increases in industry training

		2014				
	2010	BAU	I1	I2	I3	P1
GDP (2010 $m)	*187,302*	204,592	206,085	206,097	206,058	205,779
%pa from 2010		*2.2*	*2.4*	*2.4*	*2.4*	*2.4*
GDP per capita (2010 $)	*42,941*	45,254	45,584	45,587	45,578	45,517
%pa from 2010		*1.3*	*1.5*	*1.5*	*1.5*	*1.5*
Consumption	*109,491*	116,938	116,818	116,816	116,821	116,663
Investment	*36,398*	41,476	41,743	41,656	41,752	41,364
Exports	*52,425*	58,218	59,524	59,644	59,389	59,597
%pa from 2010		*2.7*	*3.2*	*3.3*	*3.2*	*3.3*
Factor cost GDP	*164,243*	179,562	180,959	180,990	180,954	180,703
%pa from 2010		*2.3*	*2.5*	*2.5*	*2.5*	*2.4*
Trade balance ($m)	*2,735*	3,485	4,438	4,381	4,554	4,665
Employment (000s)	*1,830*	1,918	1,948	1,948	1,948	1,948
%pa from 2010		*1.2*	*1.6*	*1.6*	*1.6*	*1.6*
Real wage rates	*100.0*	103.9	102.4	102.4	102.5	102.2
Trade balance (%GDP)	*1.46*	1.55	1.97	1.94	2.03	2.08
Govt balance (%GDP)	*-2.59*	-2.99	-2.74	-2.86	-2.74	-2.77

% change on baseline BAU

GDP (2010 $m)	0.7	0.7	0.7	0.6
GDP per capita (2010 $)	0.7	0.7	0.7	0.6
Consumption	-0.1	-0.1	-0.1	-0.2
Investment	0.6	0.4	0.7	-0.3
Exports	2.2	2.4	2.0	2.4
Factor cost GDP	0.8	0.8	0.8	0.6
Trade balance ($m change as % of GDP)	0.4	0.4	0.5	0.5
Employment	1.6	1.6	1.6	1.6
Real wage rates	-1.4	-1.4	-1.3	-1.6

Table 7.6 Longer-term impact of increases in industry training

		2021				
	2010	BAU	I1	I2	I3	P1
GDP (2010 $m)	*187,302*	250,809	252,431	252,466	252,409	252,073
%pa from 2010		*2.7*	*2.8*	*2.8*	*2.7*	*2.7*
GDP per capita (2010 $)	*42,941*	52,467	52,807	52,814	52,802	52,732
%pa from 2010		*1.8*	*1.9*	*1.9*	*1.9*	*1.9*
Consumption	*109,491*	143,680	143,515	143,532	143,535	143,311
Investment	*36,398*	52,023	52,356	52,248	52,366	51,895
Exports	*52,425*	71,496	72,890	73,032	72,750	72,999
%pa from 2010		*2.9*	*3.0*	*3.1*	*3.0*	*3.1*
Factor cost GDP	*164,243*	220,008	221,527	221,576	221,526	221,227
%pa from 2010		*2.7*	*2.8*	*2.8*	*2.8*	*2.7*
Trade balance ($m)	*2,735*	2,485	3,678	3,630	3,821	4,032
Employment (000s)	*1,830*	2,056	2,085	2,085	2,085	2,085
%pa from 2010		*1.1*	*1.2*	*1.2*	*1.2*	*1.2*
Real wage rates	*100.0*	113.0	111.6	111.6	111.7	111.3
Trade balance (%GDP)	*1.46*	0.76	1.12	1.10	1.16	1.23
Govt balance (%GDP)	*-2.59*	-2.77	-3.73	-3.88	-3.73	-3.77

% change on baseline BAU

GDP (2010 $m)	0.6	0.7	0.6	0.5
GDP per capita (2010 $)	0.6	0.7	0.6	0.5
Consumption	-0.1	-0.1	-0.1	-0.3
Investment	0.6	0.4	0.7	-0.2
Exports	2.0	2.1	1.8	2.1
Factor cost GDP	0.7	0.7	0.7	0.6
Trade balance ($m change as % of GDP)	0.4	0.3	0.4	0.5
Employment	1.4	1.4	1.4	1.4
Real wage rates	-1.3	-1.2	-1.1	-1.5

Table 7.7 Longer-term impact on employment by industry of increases in industry training

		2021			
	2010	I1	I2	I3	P1
Employment by industry (000s)					
Agriculture	*122.3*	133.3	135.5	131.3	133.4
Other primary	*17.4*	22.2	23.2	23.1	22.2
Food and processing	*56.3*	60.2	61.6	59.0	60.3
Fabricated metal products	*60.5*	75.4	75.3	77.2	75.5
Other manufacturing	*85.5*	99.2	101.3	99.5	99.3
Building and construction	*152.1*	181.1	180.2	182.8	179.8
Trade, restaurants & hotels	*406.1*	463.5	461.3	463.3	463.6
Telecommunications	*98.5*	112.0	111.8	111.7	112.1
Finance & business servic	*262.5*	298.9	298.0	299.9	299.0
Government, educ & health	*404.6*	463.7	461.4	462.4	463.9
Other services	*164.2*	175.5	175.0	174.6	175.6
SUB-TOTALS					
Primary industries	*139.7*	155.5	158.8	154.3	155.6
Manufacturing sector	*202.3*	234.7	238.2	235.7	235.1
Services	*1,488.0*	1,694.6	1,687.8	1,694.7	1,694.1
TOTAL	*1,830.0*	2,084.8	2,084.8	2,084.8	2,084.8
% change on baseline BAU in employment by industry					
Agriculture		2.1	3.9	0.6	2.2
Other primary		4.5	9.4	8.6	4.6
Food and processing		3.1	5.6	1.2	3.3
Fabricated metal products		4.2	4.1	6.8	4.5
Other manufacturing		4.0	6.2	4.3	4.1
Building and construction		1.5	1.1	2.5	0.8
Trade, restaurants & hotels		1.1	0.6	1.1	1.1
Telecommunications		1.1	1.0	0.8	1.2
Finance & business services		0.9	0.6	1.2	0.9
Government, educ & health		0.5	0.0	0.2	0.5
Other services		1.1	0.9	0.7	1.2
SUB-TOTALS					
Primary industries		2.5	4.6	1.7	2.6
Manufacturing sector		3.8	5.4	4.3	4.0
Services		0.9	0.5	1.0	0.9
TOTAL		1.4	1.4	1.4	1.4

Table 7.8 Longer-term impact on occupations of increases in industry training

		2021			
	2010	I1	I2	I3	P1
Employment by Occupation (000s)					
Professionals	*570.1*	640.6	640.6	640.6	640.6
Skilled labr ex bldg trades	*314.4*	351.7	349.1	359.7	351.7
Building trades	*91.9*	106.5	104.1	110.2	106.5
Semi-skilled labour	*596.4*	676.3	676.0	668.9	676.3
Elementary-skilled labour	*257.2*	309.7	314.9	305.3	309.7
TOTAL	*1,830.0*	2,084.8	2,084.8	2,084.8	2,084.8
% change on baseline BAU in employment by occupation					
Professionals		0.0	0.0	0.0	0.0
Skilled labr ex bldg trades		2.2	1.4	4.5	2.2
Building trades		2.3	0.1	5.9	2.3
Semi-skilled labour		1.6	1.6	0.5	1.6
Elementary-skilled labour		2.6	4.3	1.2	2.6
TOTAL		1.4	1.4	1.4	1.4