



Return on investment from MITO apprenticeship training in New Zealand

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Preface

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The NZ Motor Industry Training Organisation (Inc) (MITO) co-ordinates training and apprenticeships in the motor and industrial textile fabrication industries in New Zealand. MITO also sets industry standards through the development of national qualifications, promotes career pathways and provides a strategic leadership role to support education and training initiatives.

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1. Abstract

In 2008, the NZ Motor Industry Training Organisation (Inc) (MITO) commissioned a study to understand and measure the return on investment (RoI) from a MITO apprenticeship. The study included a survey among 463 employers in five sub-industries of the motor industry (automotive light engineering, automotive heavy engineering, automotive electrical, collision repair and refinishing). The study was undertaken by the New Zealand Institute of Economic Research (NZIER), and built on an approach used previously by the Canadian Apprenticeship Forum (CAF).

Key features of the MITO study are that it:

- examined the returns to apprentices, training firms and society
- measured the costs of an apprenticeship, which are excluded from many studies on return on investment from an apprenticeship
- covered periods beyond the apprenticeship, to identify the longer term benefits and costs
- covered unqualified and qualified staff as well as apprentices, to compare an apprenticeship against other ways in which firms can meet their skill and labour needs.

2. Introduction

Understanding the RoI from an apprenticeship can be useful for informing the principal stakeholders in an apprenticeship – the apprentice, his/her employer and government – especially regarding the distribution of benefits and costs from an apprenticeship across these three stakeholder groups, and how the benefits and costs move over time. This can assist in creating a “business case” for training. If organisations which facilitate apprenticeships can demonstrate that an apprenticeship is a worthwhile investment, they have a strong selling proposition for prospective apprentices, employers and government funders.

In 2008 MITO – the organisation which facilitates apprenticeship training for the New Zealand motor and industrial textile fabrication industries - commissioned a study to understand and measure the RoI from a MITO apprenticeship. This article explains the approach used and key findings.

3. Background

3.1 Return on investment concepts

An apprenticeship can be thought of as an investment decision; short term sacrifices are made for future pay-offs. The returns accrue to three main groups:

- *The apprentice* gains skills throughout the apprenticeship that improve his/her productivity, and will ultimately receive higher wages which reflect that increased productivity. The apprentice also benefits from a reduced risk of unemployment in future. In theory, the key cost to the apprentice is a short term salary sacrifice - the training firm will offer lower wages throughout the apprenticeship, and the apprentice will be prepared to accept lower wages in order to secure the future income gain. The benefits to the apprentice are potentially perpetual, as the skills acquired provide a basis for lifting his/her lifetime earnings trajectory.
- *The training firm* may receive productivity gains that are not passed on to the apprentice in terms of wages. These productivity gains may be due to the training resulting in increased speed of completing tasks, fewer mistakes, fewer accidents, less wasted materials, increased quality of work etc. Potentially large costs for the firm are the opportunity costs¹ of labour tied up in supervising and training the apprentice. The returns to the training firm are generally restricted to the period the apprentice stays during and after qualification. In addition, the costs to the training firms from an apprenticeship are front-end loaded, while the benefits accrue later. This means that employers may be concerned about apprentices being poached or leaving before the firm has received a

¹ Opportunity cost is the cost of something in terms of an opportunity foregone (and the benefits which could be received from that opportunity), or the most valuable foregone alternative i.e. the second best alternative. When a person trains or supervises an apprentice, one opportunity foregone is the lost chargeable work the tradesperson might have otherwise undertaken.

positive return. It also means the training firm has a strong incentive to contain its share of costs incurred, and/or retain apprentices and qualified staff.

- *The rest of society* may benefit from spillover effects – or “externalities”² – of the apprentice’s employment. These include the benefits to non-training firms when a trained person is hired and applies the skills they have previously learnt elsewhere. In this case industry benefits from the availability of a pool of skilled labour. There are also wider benefits beyond industry, due to the social consequences of participation in an apprenticeship (e.g. improved health/reduced crime), or the improved quality of services provided to consumers. Positive externalities provide part of the rationale for public funding of apprenticeships. For example, if training firms are concerned about other firms free-riding on their training investment, this may result in a sub-optimal (from society’s viewpoint) participation in apprenticeships, so governments intervene to increase the rate of training.

The social return encompasses all of these parts. Items which are simply transfers offset each other and drop out of the calculation. For example, the apprentice may bear some cost in terms of lower wages throughout the apprenticeship, but these are netted off as savings on outgoings for the firm when viewed from society’s perspective. This illustrates that in some respects the interests of the three groups above are conflicting – a benefit to one group may be a cost to another.

3.2 Previous studies

Most approaches to estimating RoI from apprenticeships (and other forms of education and training) focus on the benefits to the individual apprentice. They usually estimate wage premiums i.e. average differences in earnings between individuals with a certain level of education and others without that level of education. In general, no account is taken of the costs of education. This means only one side of the RoI calculation is considered – the benefits of education.

² An externality occurs when the participants in an economic transaction do not necessarily bear all of the costs or reap all of the benefits of the transaction. An example of a positive externality from training is the “poaching” externality – the skills which non-training firms gain when they hire a worker who has been trained elsewhere and do not bear the costs of that training. However, this is strictly speaking only an externality if the non-training firm gets something for nothing. In practice, the non-training firm is likely to pay higher wages to that worker which may offset any productivity gains.

In addition to excluding costs, there are two main limitations to most studies which aim to measure the returns from apprenticeships and other forms of education and training.

- *Selection bias.* Which individuals participate in an apprenticeship may be non-random. It may be that staff with higher innate ability are selected for an apprenticeship, and so they would have been more productive than others anyway. Similarly, firms that provide training may not be a random sample, but may be more motivated and dynamic than other firms. It may be more these characteristics, than their participation in training, that produces their better performance.
- *Isolating the impact of training from other factors.* A range of factors influence the wages paid to individuals, not just the qualifications they hold. Estimates of the effects of education on wages are particularly sensitive to the inclusion of good measures of labour market experience. Firm performance is also influenced by a wide range of factors other than training. Failing to control for these other influences can result in under- or over-estimating the impact of training.

Most studies find a positive return to the individual from *education* (Blundell et al 1999, 3). Some studies which have specifically examined the return to the individual apprentice from *apprenticeships* have found a positive return for men, but a zero or negative return for women (McIntosh 2004, 17; Dockery et al 1998, 44).³

Relatively few studies have examined the returns to the firm from an apprenticeship. An Australian study (Dockery et al 1997, 262) found negative returns to the firm from an apprenticeship. However, a Canadian study (Canadian Apprenticeship Forum 2006, 23) found high returns to the firm.

4. MITO study

4.1 A MITO apprenticeship

An apprenticeship is all about learning in the workplace under the supervision and mentorship of an experienced person. However, apprenticeship systems vary considerably by jurisdiction.

³ The low returns for women are attributed to females being concentrated in lower paid occupations such as hairdressing (Dockery et al 1998, 44).

In New Zealand, apprenticeships can be undertaken at any age. While there is a three-way training agreement between the apprentice, the employer and the industry training organisation (ITO) (the organisation which receives funding from government and facilitates the apprenticeship), this is separate from the apprentice's employment contract. So the apprentice can terminate his/her employment (and therefore apprenticeship) at any time. This is important when examining RoI, as the length of time an apprentice stays with the training firm may have a significant influence on the returns received by that firm.

MITO is the ITO which facilitates apprenticeships in the New Zealand motor and industrial textile fabrication industries. A MITO apprenticeship is:

- competency-based training which results in a National Certificate (vocational level nationally-recognised qualification) on the New Zealand National Qualifications Framework
- primarily undertaken and assessed on-the-job (i.e. work-based learning under the instruction of a supervisor), but with an off-job component (paper or electronic based distance learning, block courses, evening classes and specialist courses via polytechnics and other training providers)
- self-paced with a duration of around three to four years
- supported and co-ordinated by MITO, but the employer recruits the apprentice and manages the employment contract
- part-funded by the government (but not via a direct subsidy to employers) and industry (via an annual training fee payable by the apprentice or employer to MITO).

4.2 Objectives

The prime objective of the MITO study was to understand and measure the RoI from a MITO apprenticeship in selected sub-industries to apprentices, training firms and society. The ultimate goal was to inform the investment decisions of the various stakeholders in a MITO apprenticeship.

4.3 Links with CAF approach

In 2006, the Canadian Apprenticeship Forum (CAF) conducted a study which examined the returns to training firms from apprenticeship training in Canada in 15 sub-industries (Canadian Apprenticeship Forum 2006, 1-40). The sub-industries included some in the motor industry. The study measured the benefits and costs of an apprenticeship to a representative firm in each year of the apprenticeship. It used a survey among 433 Canadian employers of apprentices.

The CAF study offered a proven approach for measuring RoI from an apprenticeship to the training firm. What appears to have been a similar approach was used earlier in Australia (Dockery et al 1997, 255-273).

MITO contacted CAF about the possibility of conducting a study based on CAF's approach. CAF provided MITO with a copy of the questionnaire used in its study.

The MITO study was broadly based on the CAF approach. However, MITO's objectives were wider than CAF's. They included understanding and measuring the returns to apprentices and society, as well as measuring the returns to training firms (the focus of the CAF study). MITO adapted the approach used by CAF to meet its wider objectives.

4.4 Key features of the MITO study

MITO commissioned the New Zealand Institute of Economic Research (a specialist economic research consultancy) in collaboration with UMR Research (a market research agency) to conduct the RoI study. The study was conducted throughout 2008 and comprised two main stages.

The qualitative stage aimed at understanding the main benefits and costs of a MITO apprenticeship. It also provided a platform from which to develop the quantitative stage, in particular to fine-tune the CAF approach to MITO's objectives. It comprised depth interviews and focus groups with employers, apprentices and other stakeholders, and a literature review.

The quantitative stage comprised an employer survey aimed at measuring the benefits, costs and RoI from a MITO apprenticeship to the training firm, the apprentice and society. It comprised a postal

survey among 463 employers of MITO apprentices in five motor sub-industries covered by MITO (automotive light engineering, automotive heavy engineering, automotive electrical, collision repair and refinishing). These sub-industries were selected on the basis that they are large enough to generate a sufficient sample size to allow an analysis of ROI per sub-industry.

The principal features of the employer survey were that:

- the benefit to *the training firm* measured by the survey was labour productivity (revenue generated by the apprentice, derived from hourly charge-out rates and hours of chargeable work); the costs were wages, the employer's share of the MITO annual training fee, training expenses such as other course fees and accommodation and travel, the opportunity cost of supervision, the opportunity cost of time attending courses, and materials wastage and re-work
- the benefit (and cost in the early years of the apprenticeship) to the *apprentice* captured by the survey was the apprentice's wages compared with those of unqualified staff; an additional cost was the apprentice's share of the MITO annual training fee
- the *social return* from a MITO apprenticeship was calculated as an extension of the private returns to the training firm and the apprentice; the survey data was supplemented with information on government expenditure on a MITO apprenticeship (a cost to society)
- the questions related to an "average" MITO apprentice in each year of the apprenticeship and beyond, as well as qualified and unqualified staff in the same sub-industry with varying years experience for comparison purposes; the questions were kept as consistent as possible across the various staff categories so that, for example, the opportunity cost of supervising unqualified and qualified staff (as well as apprentices) could be estimated.⁴

⁴ The cost of recruiting qualified staff, a potential additional cost to employers of employing qualified staff trained elsewhere compared with employing an apprentice, was not covered in the employer survey. In the qualitative stage of the study, employers indicated that the costs of hiring a qualified person do not differ greatly from those of hiring an apprentice.

5. Key findings from MITO study

5.1 Returns to the training firm

The key findings in relation to the returns to the training firm, based on the employer survey, are identified in the bullet points below.

- *A MITO apprenticeship is a good investment for the training firm.* The total benefits exceed the total costs over the apprenticeship period (i.e. benefit cost ratios (BCRs) of greater than one were found in each of the five sub-industries).⁵ The payback period across *all* sub-industries in total fell in year two of the apprenticeship.⁶ Given that employers indicated that apprentices stay around five years on average from the start of the apprenticeship, this suggests an apprenticeship is a worthwhile investment for the training firm.
- *The length of time the apprentice stays greatly affects the training firm's return,* as the training costs are front-end loaded while the benefits accrue later.
- *The opportunity cost of supervision is the main cost to the training firm,*⁷ other than wages. The MITO annual training fee is the smallest cost component.
- *What an apprenticeship is compared against is important.* The positive returns above compared an apprenticeship with a “counter-factual” of employing no staff at all.⁸ In other words, if the apprenticeship did not exist, all revenues and costs associated with it would be lost to the training firm. However, when an apprenticeship is compared against employment of unqualified staff in the same sub-industry and (especially) qualified staff trained elsewhere, the results are generally less favourable. Here the payback periods to the training firm (across all sub-industries in total)

⁵ The benefit cost ratio (BCR) is the present value of cumulative benefits divided by the present value of cumulative costs. A project is usually considered worthwhile if its BCR is greater than one.

⁶ The payback period is the point in time at which cumulative benefits exceed cumulative costs.

⁷ This cost is based on employers' *estimates* in the survey questionnaire of lost chargeable time due to supervision. Employers' responses varied widely. Note that supervision time is not usually systematically monitored by employers in the sub-industries covered in the survey, based on the qualitative findings.

⁸ The counterfactual is what the benefits and costs of an apprenticeship are compared against i.e. the situation which would prevail in the absence of the apprenticeship.

were eight years and ten years or more respectively.⁹ However, these findings should be interpreted with care, as unqualified staff/qualified staff trained elsewhere may differ materially from apprentices/“homegrown” staff; these differences need to be understood.

Enhanced labour productivity - the revenue generated per apprentice – is the sole measure of benefit to the training firm from a MITO apprenticeship covered in the survey. However, the interviews with employers in the qualitative stage of the study revealed that enhanced productivity is not the only benefit they identified. Other benefits included: having a more stable staff (as an apprentice is more likely to stay with the firm compared with an unqualified person of a similar age); addressing skill shortages; training to the firm’s individual requirements; offering a structured approach to training.

5.2 Returns to the apprentice

A MITO apprenticeship is a worthwhile investment for apprentices, based on the employer survey results, but the payback period may be longer than the time apprentices stay with their training firms. Apprentices receive lower wages than unqualified staff initially, and it takes around nine years on average from the start of the apprenticeship to make up that lost ground in cumulative terms and to recoup other costs to apprentices (their share of the MITO annual training fee).¹⁰

Future earnings growth is not the only benefit sought by apprentices from an apprenticeship, based on the interviews with apprentices in the qualitative stage of the study. The attainment of the qualification itself – the “piece of paper” – was the main benefit cited by apprentices. Apprentices saw this as a passport to a range of opportunities, both within their sub-industry and elsewhere, and as a source of confidence and pride.

⁹ The period of analysis for the employer survey was nine years, by which time a positive return for an apprenticeship relative to qualified staff trained elsewhere had yet to be achieved.

¹⁰ The counter-factual here is unqualified staff. The main benefit to apprentices from an apprenticeship is higher future wages than they would otherwise have received, and the main cost lower wages throughout the apprenticeship. Unqualified staff provide the comparison for “than they would otherwise have received”.

5.3 Returns to society

The social return estimated from the employer survey compares the value of output gained from a MITO apprenticeship against the costs incurred. It is calculated as an extension of the private returns to the training firm and apprentice, and the results were very similar to those for the training firm. The payback period for the social return (across all sub-industries in total, and based on a counter-factual of employing no staff at all) was three years compared with two years for the training firm. This difference was due to the inclusion of additional cost items in the social return calculation, namely government expenditure on a MITO apprenticeship and the apprentice's share of the MITO annual training fee.

However, there are spillover benefits beyond the training firm and the apprentice which are excluded from this calculation of social return. This means the employer survey will understate the social return to some extent. Although difficult to measure, these spillover benefits provide a fundamental reason for government's investment in apprenticeships.

The qualitative stage identified a range of spillover benefits in relation to:

- the social consequences of the apprentice's employment e.g. averted social costs of ill health/unemployment/crime, improved social cohesion, flow-on effects to the apprentice's family and friends
- the motor industry e.g. availability of skilled labour, fewer workplace accidents
- the motoring public e.g. enhanced services, fewer road traffic accidents.

5.4 Calculated benefits and costs

A breakdown of the main benefits and costs to society of a MITO apprenticeship, drawn from the results of the employer survey, is presented in Table 1. Note that this is for all the sub-industries in total, is based on a counter-factual of employing no staff at all, and covers the five-year period employers indicate that apprentices stay on average with the training firm.

The value of output/revenue (a benefit to the training firm), presented in the first row, is the only benefit to society identified in Table 1. The next eight rows show the main costs, primarily to the training firm. Note that the table does not identify the main benefits and costs to the apprentice nor the hard-to-measure spillover benefits to society.

Table 1 *Social return: breakdown of calculated benefits and costs*

Average costs and revenues per staff member per annum, NZ dollars

| Year from start | 1 | 2 | 3 | 4 | 5 |
|-------------------------------------|-----------------|-----------------|-----------------|-----------------|------------------|
| Benefits | | | | | |
| Value of output (revenue) | \$61,016 | \$79,135 | \$94,578 | \$108,288 | \$111,182 |
| Costs | | | | | |
| Labour cost (wages) | \$28,545 | \$32,617 | \$36,796 | \$41,301 | \$44,564 |
| MITO annual training fee | \$859 | \$859 | \$859 | \$859 | \$0 |
| Training expenses (employer) | \$986 | \$994 | \$1,086 | \$1,255 | \$1,286 |
| Opportunity cost of supervisor time | \$31,245 | \$27,877 | \$19,889 | \$16,272 | \$12,113 |
| Opportunity cost of apprentice time | \$2,181 | \$2,730 | \$3,392 | \$4,056 | \$2,272 |
| Wastage and re-work | \$4,337 | \$3,677 | \$4,533 | \$3,937 | \$3,242 |
| Total Training Cost | \$39,609 | \$36,137 | \$29,758 | \$26,379 | \$18,913 |
| Government expenditure | \$2,488 | \$2,488 | \$2,488 | \$2,488 | \$0 |
| Annual net benefit | -\$9,625 | \$7,893 | \$25,536 | \$38,120 | \$47,705 |
| Cumulative net benefit | -\$9,625 | -\$1,732 | \$23,804 | \$61,925 | \$109,630 |

Notes: (1) “Year from start” indicates the stage the apprentice is at in the apprenticeship and beyond.

One year from start indicates a first year apprentice; five years from start a recently qualified person.

(2) “Annual net benefit” is the benefits (value of output/revenue) minus the costs (wages, total training cost and government expenditure) in that year. “Cumulative net benefit” is the sum of annual net benefits in that year and previous years.

The key points from Table 1 are as follows.

- *The payback period for society is year three.* Cumulative net benefit is negative in the first two years and then turns positive, due to output/revenue increasing over time and total training costs falling.
- *The opportunity cost of supervision is by far the largest cost (other than wages).* This cost reduces over the course of the apprenticeship and beyond.

- *The training firm bears the bulk of the costs.* By far the majority of costs are borne by the training firm, with a smaller share incurred by the apprentice, and an even smaller share borne by government. However, the training firm is also the principal beneficiary of the apprenticeship over this period.

6. Conclusions

Return on investment from an apprenticeship is based on the premise that training is a form of investment that raises the productivity of those receiving it, sufficient to outweigh the costs of the training. The training firm, the apprentice and society in general benefit from an apprenticeship. The study which NZIER undertook for MITO sought to understand and measure the returns to each of these three groups.

The study comprised qualitative research to understand the returns, and an employer survey to measure them. Directly measuring labour productivity, as well as other benefits and costs of a MITO apprenticeship, was a key feature of the employer survey. The employer survey broadly followed that developed previously in Canada by CAF. Much of the findings from the CAF and MITO studies are similar in relation to the measured returns to the training firm.

A MITO apprenticeship is a worthwhile investment, as revealed by the MITO study. Positive returns are received by the training firm and society within the period (around five years) that the apprentice stays on average with the training firm. The apprentice takes a somewhat longer period to receive a positive return. This is not a critical concern, as the skills acquired stay with the apprentice and provide a basis for lifting his/her lifetime earnings trajectory. In addition, there are benefits from a MITO apprenticeship to the training firm, apprentice and the rest of society which are not captured in the employer survey.

What an apprenticeship is compared against has a major bearing on the calculated returns. Although the training firm receives a positive return per se over the five year period the apprentice stays, over the same period the firm could be financially better off employing unqualified staff or staff trained

elsewhere. This provides little incentive for firms to train, and so may result in a sub-optimal (from society's perspective) level of training. Government invests in apprenticeships to encourage firms to train, and to recognise hard-to-measure spillover benefits to non-training firms and the rest of society.

The training firm bears most of the costs and reaps most of the benefits from a MITO apprenticeship over the five year period that the apprentice stays with the training firm.

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