



# Agribusiness and Economics Research Unit

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## Measuring the Economic Impact of Whānau Ora Programmes: He Toki ki te Mahi Case Study

Paul Dalziel  
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Prepared for  
Ihi Research and Development

Research Report No. 343  
August 2017



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## Contents

<b>LIST OF FIGURES</b>	<b>v</b>
<b>LIST OF TABLES</b>	<b>v</b>
<b>ACKNOWLEDGEMENTS</b>	<b>vi</b>
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.1 Whānau Ora	1
1.2 Evaluating initiatives funded by Te Pūtahitanga o Te Waipounamu	2
1.3 The Agribusiness and Economics Research Unit	2
1.4 Structure of the report	3
<b>CHAPTER 2 THE CHOSEN CASE STUDY: HE TOKI KI TE MAHI</b>	<b>5</b>
2.1 He Toki ki te Mahi	5
2.2 The participants in <i>He Toki ki te Mahi</i>	6
2.3 Outcomes achieved by the participants	8
<b>CHAPTER 3 ECONOMIC BENEFITS OF HE TOKI KI TE MAHI</b>	<b>11</b>
3.1 Two mechanisms for economic benefits	11
3.2 The income data used in the analysis	12
<b>CHAPTER 4 RESULTS OF THE COST BENEFIT ANALYSIS</b>	<b>17</b>
4.1 The counterfactual	17
4.2 The estimated potential economic benefits	18
4.3 The estimated economic costs	20
4.4 Sensitivity analysis	22
4.5 Conclusion	25
<b>REFERENCES</b>	<b>27</b>

## List of Figures

Figure 2.1: Age distribution of the participants	6
Figure 2.2: Previous school or work situation of the participants	7
Figure 2.3: Had the participant completed a pre-trade course?	8
Figure 2.4: Outcomes for the participants at 30 June 2017	9
Figure 3.1: Average annual income, all industries, by age band, June 2016	13
Figure 3.2: Average annual income, all industries, by age, June 2016	14
Figure 3.3: Average annual income, three selected industries and qualifications, by age, June 2016	16
Figure 4.1: Illustration of the economic benefits	19
Figure 4.2: Sensitivity analysis of benefits compared to costs for different completion rates by apprentices	25

## List of Tables

Table 3.1: Previous and current situations of the participants	11
Table 3.2: Average weekly income, by industry and highest qualification, June 2016	15
Table 4.1: Sources of the potential economic benefits	20
Table 4.2: Current cohort participants and funding, 2015/16 – 2019/21	21
Table 4.3: Categorisation of conservative and optimistic assumptions in the analysis	23
Table 4.4: Percent of apprentices completing a qualification by ethnic group, 2007 - 2016	24

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## Chapter 1 Introduction

In May 2017, the AERU was contracted by Ihi Research and Development to perform a cost benefit analysis of an initiative funded by Te Pūtahitanga o Te Waipounamu under the Whānau Ora programme. The chosen initiative was *He Toki ki te Mahi* and the AERU was asked to provide an analysis of its economic impact to a high professional standard, taking into account guidelines published by the New Zealand Treasury. This research report presents the details of the AERU analysis.

### 1.1 Whānau Ora

In 2009, the New Zealand Government commissioned a Taskforce chaired by Professor Sir Mason Durie to construct an evidence-based framework for preparing whānau-centred initiatives. The Taskforce reported to Hon Tariana Turia (Minister for the Community and Voluntary Sector) in April 2010; see Durie *et al.* (2010). A governance group was set up to oversee implementation of a transformed approach to the design and delivery of whānau-centred initiatives known collectively as Whānau Ora, and 25 Whānau Ora provider collectives were announced by the Government in October 2010 (Turia, 2011, p. 11).

In 2012, a review and assessment of the delivery of the Whānau Ora approach led to Phase II being launched in 2014, in which three Commissioning Agencies – Te Pou Matakana (North Island), Te Pūtahitanga o Te Waipounamu (South Island) and Pasifika Futures (Pacific people in New Zealand) – were contracted to invest in activities to achieve Whānau Ora outcomes and build whānau capability (Te Puni Kōkiri, 2017, pp. 8-9).

Whānau Ora outcomes are defined by the Whānau Ora Partnership Group, who have affirmed that Whānau Ora is achieved when whanau are (Te Puni Kōkiri, 2016, p. 1):

- self-managing;
- living healthy lifestyles;
- participating fully in society;
- confidently participating in Te Ao Māori;
- economically secure and successfully involved in wealth creation;
- cohesive, resilient and nurturing; and
- responsible stewards of their natural and living environments.

Te Pūtahitanga o Te Waipounamu is a legal partnership of the nine iwi of the South Island: Ngāi Tahu, Ngāti Apa ki te Rā Tō, Ngāti Tama, Ngāti Kuia, Ngāti Koata, Te Ati Awa, Ngāti Toa Rangatira, Rangitāne and Ngāti Rarua (Savage *et al.*, 2016, p. 9). It has adopted a distinctive approach to commissioning initiatives, which is based on a Whānau Ora ecosystem that places priority on whānau aspirations (Te Pūtahitanga o Te Waipounamu, 2016, p. 6).

## 1.2 Evaluating initiatives funded by Te Pūtahitanga o Te Waipounamu

Ihi Research and Development completed an evaluation of the twenty-three Wave One initiatives funded in the first year by Te Pūtahitanga o Te Waipounamu. The Executive Summary of that report concluded with the following observations (Savage *et al*, 2016, p.7):

This evaluation identified new learning that can contribute to a growing body of research informing whānau centred initiatives. The process of commissioning whānau enterprise initiatives has the potential to transform outcomes for whānau and the partnership model has influenced the practice of mainstream organisations. Whilst the systems and process within the organisation require continuous development to meet the expectations of whānau and stakeholders, both the whānau enterprise initiatives and the commissioning agency are innovative and exploring new frontiers in whānau centred approaches. The approach created the conditions to build capability as whānau self-identified learning needs, built on their existing cultural knowledge and life experiences, and applied new knowledge that was practical and relevant to their situation. This evaluation indicates that while this is challenging there are definite indicators that this approach has the potential to bring about substantial social change.

In 2017, Te Pūtahitanga o Te Waipounamu commissioned Ihi Research and Development to undertake a further evaluation of its suite of funded initiatives, including attention to the Whānau Ora outcome of whānau being economically secure and successfully involved in wealth creation. Consequently, the Agribusiness and Economics Research Unit (AERU) at Lincoln University was contracted to undertake the research outlined in this report.

## 1.3 The Agribusiness and Economics Research Unit

The Agribusiness and Economics Research Unit (the AERU) was founded at Lincoln University in 1962. For more than 50 years, it has produced rigorous economic, market and social research for domestic and international agencies, government departments, companies and other organisations. The AERU operates as a semi-autonomous research unit within Lincoln University, providing commercially competitive research services for clients while maintaining the independence and high academic standards of the University.

The AERU research team for this project was led by its Director and Deputy Director, Professor Paul Dalziel and Professor Caroline Saunders, with the assistance of Research Fellow, Meike Guenther. Paul Dalziel and Caroline Saunders each have more than 30 years of experience in applied economics research and are the authors of *Wellbeing Economics: Future Directions for New Zealand*, published by Bridget Williams Books in 2015. Meike Guenther has been a researcher in the AERU since 2008 and has participated in a number of projects evaluating economic impacts at a regional level.

## 1.4 Structure of the report

This report presents the results from the AERU analysis. Chapter 2 presents the case study that was jointly chosen by the AERU and Ihi Research and Development – *He Toki ki te Mahi*. This presentation includes descriptions of the programme participants in the first two years of its operations. *He Toki ki te Mahi* was selected because it specifically aims to invest in the economic potential of its participants through skills development, which can be expected to produce lifetime benefits (see, for example, OECD, 2012, and Dalziel and Saunders, 2014, pp. 37-39).

Chapter 3 then describes the way in which the cost benefit analysis was designed and the data that was used. This description has been written for a general audience. It focuses on the two major benefits of the programme that were identified and how these benefits were measured using data from the Income Supplement to the Household Labour Force Survey in June 2016.

Chapter 4 presents the results of the analysis. The net present value as at 30 June 2017 of potential economic benefits from increased capabilities being achieved by the participants in the initiative to date is estimated to be above \$5,500,000. The initiative received funding of \$250,000 in its first year (including provision for significant set-up costs) and \$80,000 in its second year. The analysis allows for a further four years of funding at \$80,000 per annum to provide support for the current cohort of participants. These costs are funded from general taxation, and so the analysis makes an allowance for the deadweight loss of taxes, raising the total cost to \$780,000. Thus the analysis finds that *He Toki ki te Mahi* has the potential to return seven times its cost in economic benefits.



## Chapter 2

### The Chosen Case Study: He Toki ki te Mahi

As noted in the introduction, *He Toki ki te Mahi* was selected because it specifically aims to invest in the economic potential of its participants through skills development, which can be expected to produce lifetime benefits. This chapter describes this initiative. Section 2.1 draws on previous reports to introduce the initiative. Section 2.2 provides some descriptive data about the participants in the programme. Section 2.3 summarises the outcomes achieved by the participants as at 30 June 2017, the cut-off date for the analysis.

#### 2.1 He Toki ki te Mahi

The material in this section are drawn from the *Initiatives Handbook 2016* of Te Pūtahitanga o Te Waipounamu (2016, especially page 24) and *The Evaluation of Wave One Initiatives* by Savage *et al.* (2016, pages 19-21).

In 2011, Hawkins Construction, Te Rūnanga o Ngāi Tahu and the Christchurch Polytechnic Institute of Technology (now named Ara) entered into a partnership to create a pre-trade Māori trade training programme called *He Toki ki te Rika*. In 2014, the He Toki ki te Mahi Trust was created to build on that earlier initiative by supporting the pre-trade graduates to obtain and complete apprenticeships in the construction industry.

The support takes place in three dimensions, all of which are required for the success of the initiative.

First, the **rangatahi** are provided with practical support to offset experiences of cultural isolation or feelings of being overwhelmed by the magnitude of their efforts. The Trust has employed a mentor who comes from a coaching background and offers onsite mentoring visits to support apprentices in their work and as a friend. Apprentices can call the mentor at any time. The Trust provides apprentices with financial assistance for purchasing tools and equipment, and also covers ongoing course fees.

Second, the initiative takes a **whānau** approach that includes bringing the whole whānau on the journey to support the new apprentice. This is reinforced by consciously networking each cohort of apprenticeships with each other within a kaupapa Māori approach.

Third, the Trust works hard to build trust among potential and current **employers** and to mitigate some of the risks and costs of engaging an apprentice. The Trust, for example, carried out employment administration tasks, including paying wages, holiday pay, ACC, Kiwisaver, sick leave and bereavement leave. Apprentices are supplied with safety equipment.

## 2.2 The participants in *He Toki ki te Mahi*

Ihi Research and Development provided the AERU with the following details recorded for each of 51 participants in the *He Toki ki te Mahi* initiative to the end of April 2017:

- Age of the participant in 2017
- Start date (month and year)
- Previous school or work situation
- The type of pre-trade course completed (if applicable)
- Current work situation (including apprenticeship if applicable)

Two persons were recorded as leaving the programme very shortly after starting (just two days in one case), so that details about previous and current work situations were missing from the data. Both of these participants were excluded from the analysis.

Figure 2.1 records the age distribution of the remaining 49 participants who were included in the analysis. This is strongly weighted towards people in their early 20s, so that the benefits from participation are potentially enjoyed for a working life of four decades. This observation is a significant aspect of the cost benefit analysis in Chapter 4.

**Figure 2.1: Age distribution of the participants**

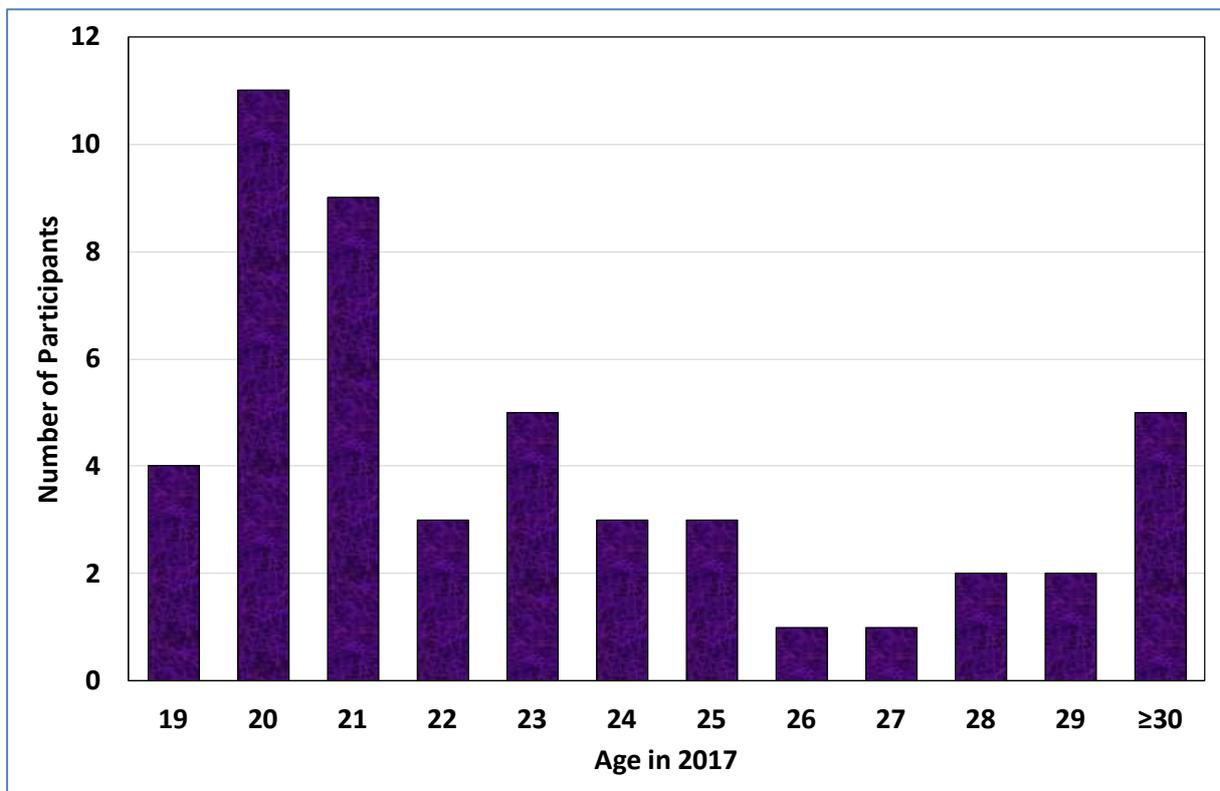
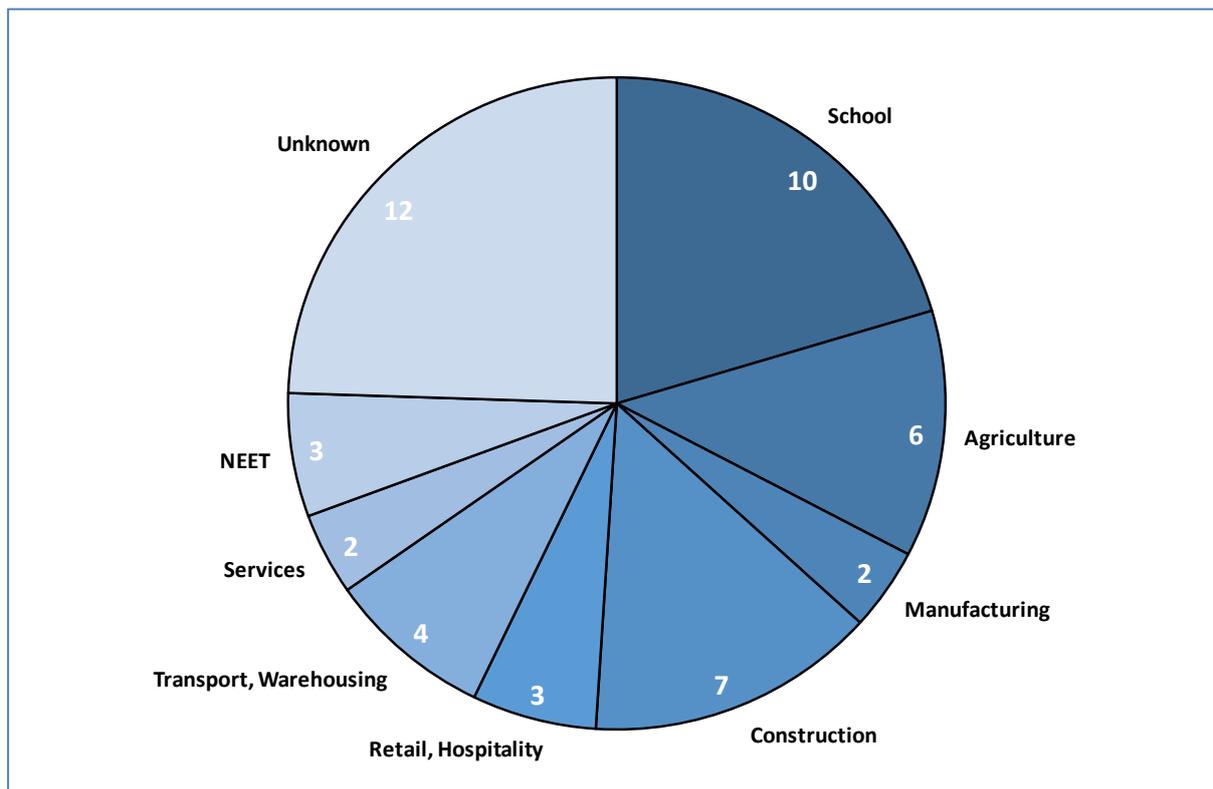


Figure 2.2 presents data on the previous school or work situation of the 49 participants. This is recorded for the participant before they entered the pre-trade course (if applicable) or before

they entered He Toki ki te Mahi. This information is unknown for 12 of the participants and 10 of the participants entered from school. Of the remaining 27 participants, only seven were already employed in the construction sector and three were not in employment, education or training (NEET). The success of the initiative in shifting participants from relatively low productivity industries to the relatively high productivity construction industry is one of the mechanisms creating strong economic benefits in the analysis of the following chapter.

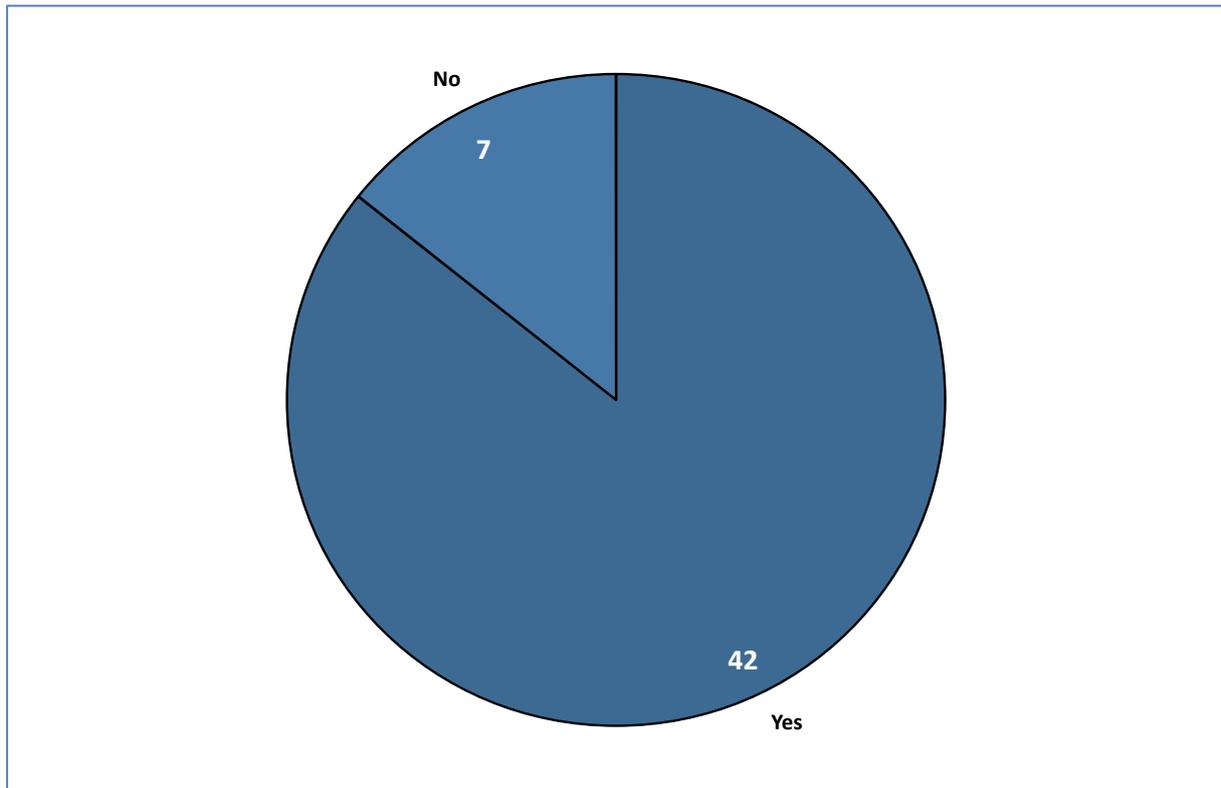
**Figure 2.2: Previous school or work situation of the participants**



Note: NEET = Not in Employment, education or training. These data refer to the participants' activities before they enrolled in either the pre-trade course or He Toki ki te Mahi.

The large majority of participants had completed a pre-trade course. Figure 2.3 records that this was the case for 42 out of the 49 participants.

**Figure 2.3: Had the participant completed a pre-trade course?**



### **2.3 Outcomes achieved by the participants**

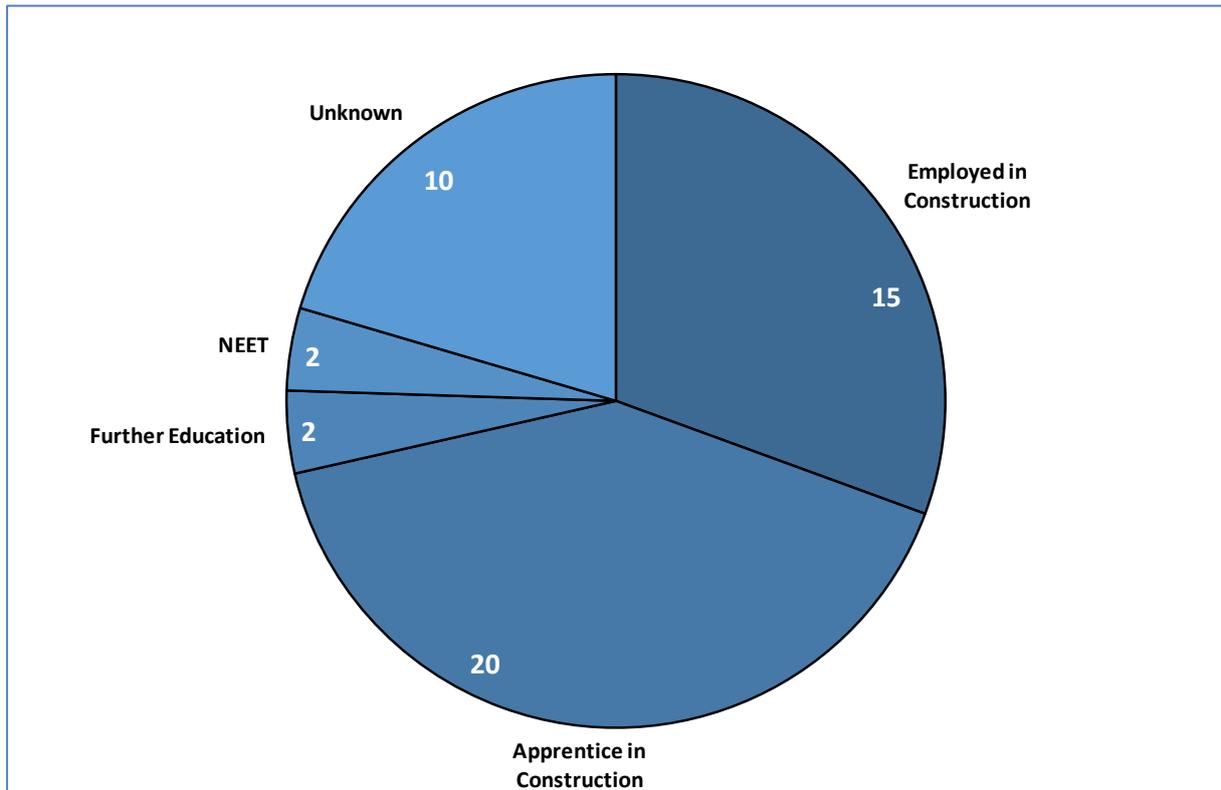
The data provided by Ihi Research and Development include the outcome achieved by each of participants in the *He Toki ki te Mahi* initiative to the end of June 2017. These data are presented in Figure 2.4.

There is no record for the current work situation of ten participants who have disengaged from the programme, except to say in three cases that they had moved out of Christchurch. The economic benefits of participation for these people are recorded as zero.

Two of the participants have moved out of the programme to move into further education in another industry (information technology and the Ara TOA Sports programme respectively). Two of the participants were not in employment, education or training (NEET) – one was unemployed and one was a parent providing full-time childcare. The economic benefits for these participants are also recorded as zero.

The remaining 35 participants are employed in the construction sector. For some, this represents a movement from a relatively low productivity sector to a relatively high productivity sector, with lifelong economic benefits. Twenty are engaged as apprentices; successful completion of the apprenticeship can again be expected to produce lifelong economic benefits.

**Figure 2.4: Outcomes for the participants at 30 June 2017**



Chapter 4 uses the data represented in Figures 2.2 and 2.4 of this chapter to estimate the net present value of the life-long economic benefits of the *He Toki ki te Mahi* initiative as at the end of June 2017. Before that, Chapter 3 explains the two mechanisms creating these benefits, which arise from some of the participants shifting from other industries to the relatively high productivity construction industry and from some participants gaining higher level skills as a result of engaging in apprenticeships.



## Chapter 3

### Economic Benefits of He Toki ki te Mahi

The purpose of this chapter is to explain the mechanisms by which the *He Toki ki te Mahi* initiative produces economic benefits. Section 3.1 brings together the data from Chapter 2 on the previous and current situations of the participants. Section 3.2 presents the income data used in the cost benefit analysis of the following section.

#### 3.1 Two mechanisms for economic benefits

The matrix in Table 3.1 is drawn from Figures 2.2 and 2.4 of Chapter 2 to show the previous and current situations of the 49 participants in *He Toki ki te Mahi*. The first cell, for example, records that 2 participants who are currently employed in the construction industry came into the pre-trades course or current programme from school.

**Table 3.1: Previous and current situations of the participants**

		Current Situation				
		Construction Employed	Construction Apprentice	Further Education	NEET	Unknown
Previous Situation	School	2	8	0	0	0
	Agriculture	1	5	0	0	0
	Manufacturing	2	0	0	0	0
	Construction	3	3	1	0	0
	Retail, Hospitality	1	1	1	0	0
	Transport, Warehousing	1	2	0	0	0
	Other Services	1	1	0	0	0
	NEET	2	0	0	2	0
	Unknown	2	0	0	0	10

Note: The shaded cells indicate that these participants are creating economic benefits as a result of moving to a higher productivity industry or increasing their qualification level.

The AERU has made the following conservative assumptions about the data in Table 3.1:

- It is assumed that the participants who entered the programmes from school would have found employment in the construction sector if the programmes had not existed. This means that the participants gain no economic benefits in the analysis unless they enter into an apprenticeship. This will understate the benefits if some of the school leavers would have been employed in a lower productivity industry (or been unemployed).
- Similarly, it is assumed that participants already employed in the construction sector before entering the programmes gain no economic benefit unless their participation leads to an apprenticeship.
- It is assumed that participants who left for further education outside the programme, or who are now not in employment, education or training, have gained no economic benefit from their participation.
- It is assumed that the 12 participants for whom the data does not record their previous and current situations have gained no economic benefit from their participation.

The remaining 27 participants are creating potential economic benefits that will be analysed in the following chapter. These are the shaded cells in Table 3.1. The two columns represent the two mechanisms that are delivering these potential benefits.

First, some of the participants have changed the industry in which they are employed, as shown in the first column. The following section will show that different industries have different productivity levels, reflected in different average income levels over a lifetime for the same qualification level. Construction is a relatively high productivity industry, and so shifting to this industry creates economic benefits.<sup>1</sup>

Second, the completion of an apprenticeship qualification would increase the productivity of the participant in the construction industry. It is too early to record data on completions – the BCITO website observes that the average length of time to complete an apprenticeship is three to four years.<sup>2</sup> Thus, the analysis in Chapter 4 will determine the *potential* economic benefits on the assumption that those currently engaged in apprenticeship studies will complete their programme.

### 3.2 The income data used in the analysis

The New Zealand Treasury (2016) provides a spreadsheet model for social cost benefit analysis along with other resources offering guidance for analysts using this tool. This CBAX model incorporates a list of publicly available New Zealand data that organisations can use to value the impacts of an intervention such as a Whānau Ora initiative.

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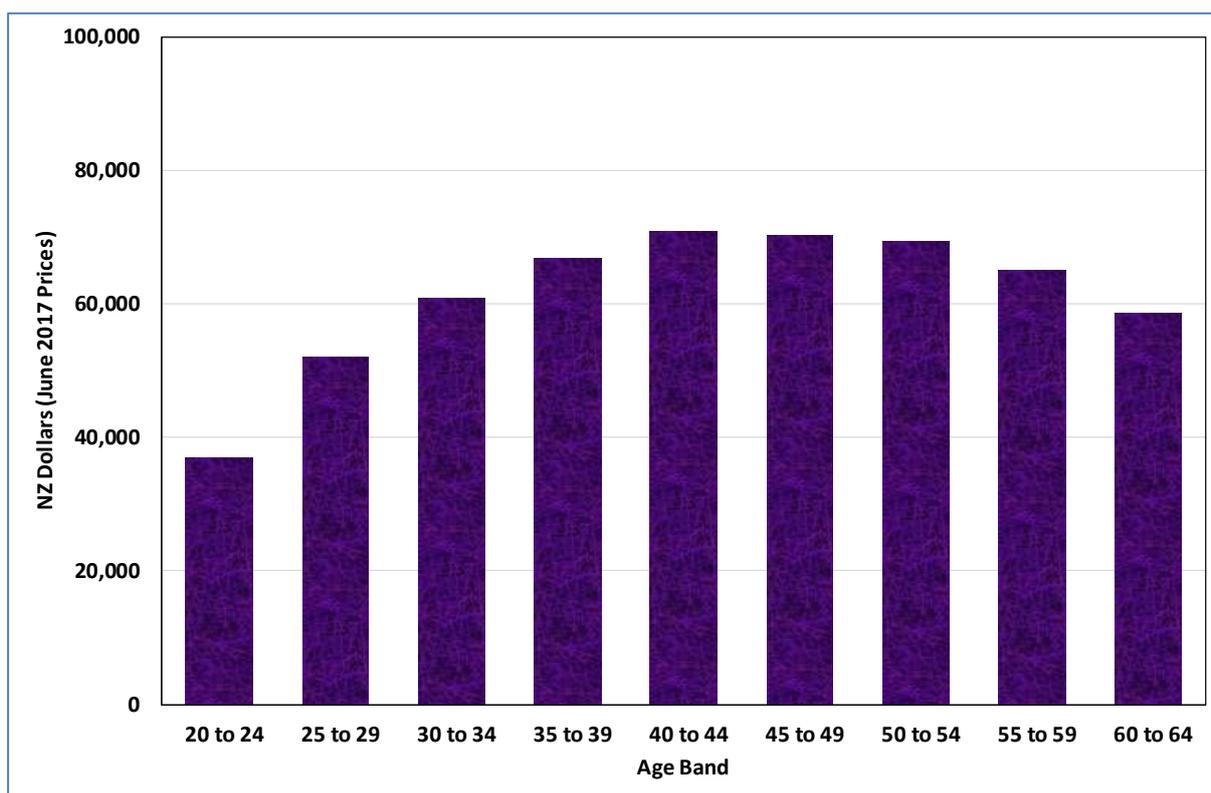
<sup>1</sup> An exception to this observation is the shift from transport and warehousing to construction. This will be explained in Chapter 4.

<sup>2</sup> <https://bcito.org.nz/apprenticeships/about-apprenticeships/how-long-apprenticeship-takes/>.

The Impacts Database of the Treasury’s CBAX model includes impacts on annual income data categorised by qualification level. It recommends that the analyst should use data from the Income Survey of Statistics New Zealand, excluding government transfer payments, rebased to 2017 values using the GDP Deflator series.<sup>3</sup> The AERU has followed that recommendation, noting that the New Zealand Income Survey has been integrated into the Household Labour Force Survey from 2016 (Statistics New Zealand, 2013). Hence this study has used the latest available income data from the June 2016 Household Labour Force Survey, rebased to March 2017 values using the implicit price deflator for gross domestic product expenditure, series SNA173AA.

Figure 3.1 depicts the data from that source for the average annual income for all industries, analysed by age band. This is a cross-sectional database; that is, it shows income levels for different age groups at a particular moment in time. It therefore does not imply that a person aged 20 to 24 today, will receive the income suggested by Figure 3.1 when aged 60 to 64. Nevertheless, it is important to take the pattern into account because cost benefit analyses can be very sensitive to the timing of benefits.

**Figure 3.1: Average annual income, all industries, by age band, June 2016**

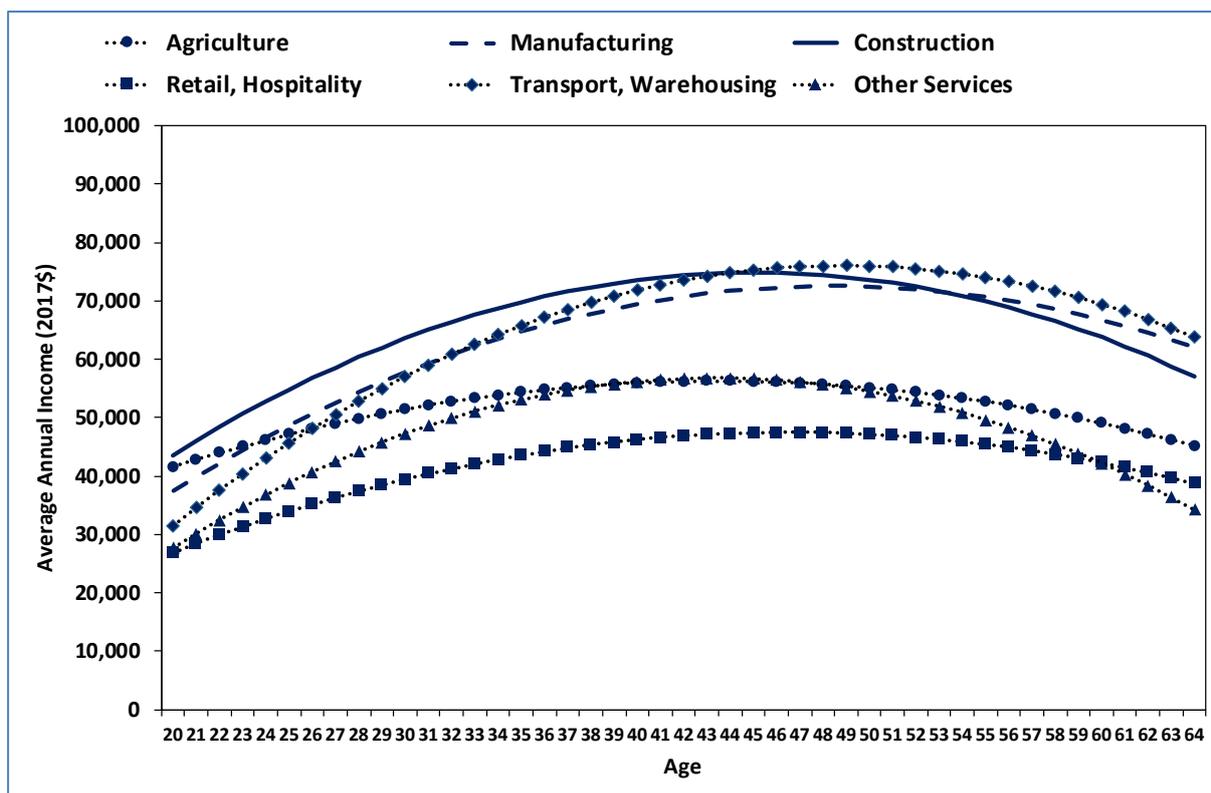


Source: Statistics New Zealand *Labour Market Statistics (Income)*.

<sup>3</sup> The model distinguishes between income received by the person after income tax and the tax revenue received by the government in order to distinguish private sector and public sector benefits. This distinction is not relevant for this current initiative that aims to determine the total economic benefit to both sectors.

In particular, it would be an overstatement of the benefits if the analysis simply took the difference in the average incomes of different industries if the difference tends to be smaller in the early years of a person’s working-life, rising to a peak twenty to thirty years later. Consequently, a distribution of average annual income was prepared for each of the six industries in Table 3.1 above.<sup>4</sup> The result is shown in Figure 3.2.

**Figure 3.2: Average annual income, all industries, by age, June 2016**



Source: Derived by AERU from Statistics New Zealand *Labour Market Statistics (Income)*.

Figure 3.2 illustrates that different industries offer different levels of average income, with the construction industry being among the higher productivity for all age groups. Shifting participants in the programme to construction from retail, hospitality, agriculture and other services can therefore have a large impact on potential income over a lifetime.

The published data from the Household Labour Force Survey analyses incomes by highest qualification levels. Table 3.2 reproduces the relevant data in its original state; that is, the data are average weekly income measured at June 2016 prices. The table is restricted to the five levels of highest qualification that are relevant for this study.

<sup>4</sup> This was done by fitting a second order polynomial equation to the data (which is standard for this type of exercise) and using the equation to interpolate values for every year from age 20 to age 64.

**Table 3.2: Average weekly income, by industry and highest qualification, June 2016**

Industry	All Persons	Highest Qualification Level				
		None	Lower Secondary School	Upper Secondary School	Level 1-3 Post School Certificate	Level 4-6 Certificate / Diploma
Agriculture	917	858	832	872	854	1,054
Manufacturing	1,149	950	1,109	981	839	1,306
Construction	1,179	1,033	1,032	1,042	1,142	1,271
Retail, Hospitality	641	586	516	513	548	807
Transport, Warehousing	1,152	970	959	1,095	859	1,419
Other Services	822	603	767	669	647	904
All Industry Groups	1,071	820	905	858	766	1,129

Source: Statistics New Zealand *Labour Market Statistics (Income)*.

Table 3.2 records a significant premium in every industry from gaining a Level 4-6 Certificate or Diploma. An apprenticeship leads to Level 4 qualifications and opens the door for higher qualifications. The database of participants in the *He Toki ki te Mahi* initiative did not provide information on the highest qualification of the participants before they entered, and so the AERU made the conservative assumption that they all held an upper secondary school (USS) qualification; that is NCEA Level 2 or 3.<sup>5</sup>

The published data behind Table 3.2 do not include age analysis. Hence the AERU proceeded by assuming that the pattern for each industry shown in Figure 3.2 can be applied for each qualification level within the industry.

To illustrate this procedure, consider people with a USS qualification and employed in the agriculture industry. From Table 3.2, the average weekly income of these people in June 2016 was \$872. The average weekly income of all people in the agriculture industry was \$1,071.

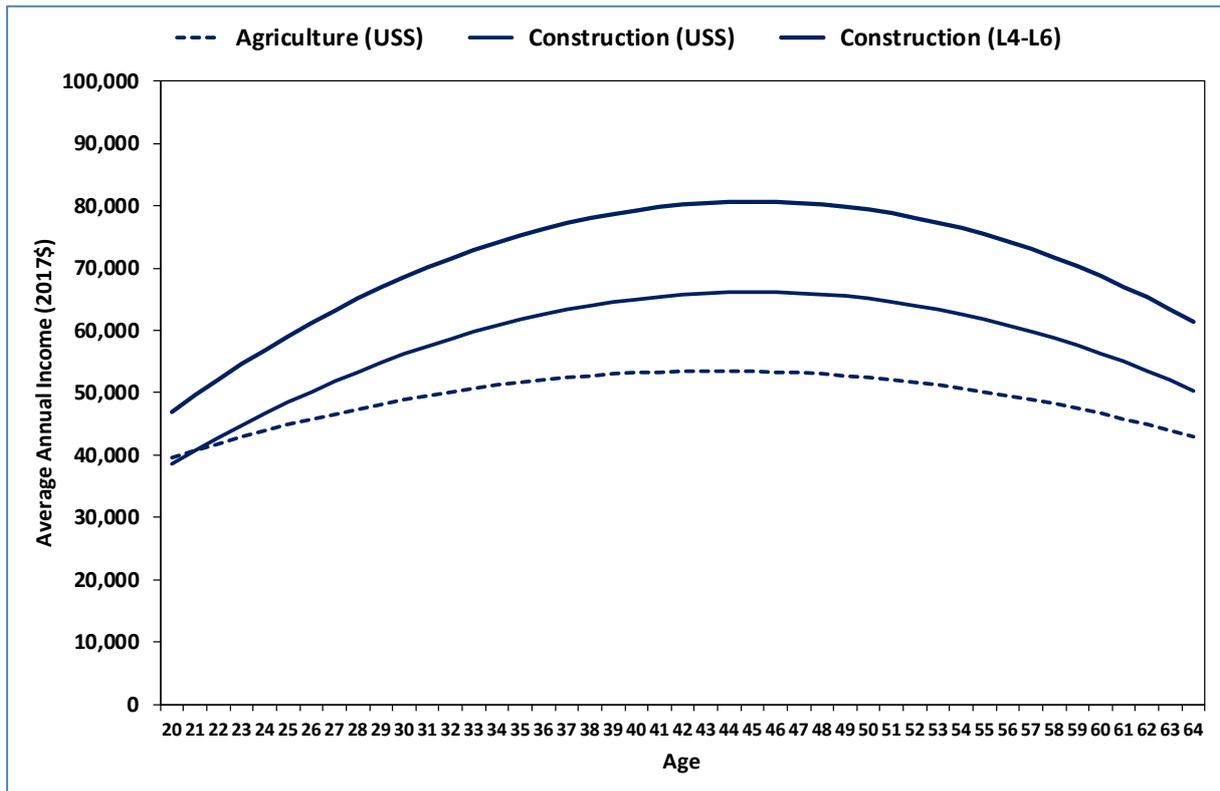
Hence, the USS qualified people earned, on average,  $872/1071 = 95.1$  per cent of the industry average. This ratio was then applied for each age in the agriculture series shown in Figure 3.2.

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<sup>5</sup> The AERU has been advised that most participants have no school qualification or NCEA Level 1. We have nevertheless maintained a conservative approach in this assumption to balance the fact that completion of an apprenticeship involves a qualification at the lower end of the L4 to L6 band.

Figure 3.3 illustrates the two mechanisms by which the *He Toki ki te Mahi* initiative produces potential economic benefits. It shows income distributions by age for agriculture and for construction, with the latter income distribution shown at two qualifications levels (Upper Secondary School and Levels 4 to 6).

**Figure 3.3: Average annual income, three selected industries and qualifications, by age, June 2016**



Source: Derived by AERU from Statistics New Zealand *Labour Market Statistics (Income)*.

A person with USS qualifications at age 20 earns similar income in the agriculture industry and in the construction industry, but the second industry offers a better lifetime income with that qualification. Thus, shifting a participant from agriculture to construction shifts the person from the bottom dotted pathway to the middle pathway, creating potential economic benefits.<sup>6</sup>

Second, for a participant employed in the construction sector, successful completion of an apprenticeship moves the person from the thin solid line up to the thick solid line, creating further potential economic benefits.

Chapter 4 quantifies these two mechanisms in a formal cost benefit analysis.

<sup>6</sup> As noted in footnote 1 above, this effect does not occur if the shift is from transport and warehousing to construction. This is because in the AERU modelling, the transport and warehousing industry offers higher wages than construction for USS qualifications after the age of 35.

## Chapter 4

### Results of the Cost Benefit Analysis

Cost benefit analysis is first and foremost an organising principle. It is a way of organising information in a consistent and systematic way. It is about making best use of whatever information is available. It is about evidence-based policy development.

Gabriel Makhoulouf  
Secretary to the Treasury  
(Treasury, 2015, p. 3)

The above quote comes from the Preface to the New Zealand Treasury's *Guide to Social Cost Benefit Analysis*, published in July 2015. This chapter uses that *Guide* to undertake a consistent and systematic cost benefit analysis of the *He Toki ki te Mahi* initiative, using information available at 30 June 2017. It begins in section 4.1 by describing the counterfactual; that is, the assumed outcomes in the absence of *He Toki ki te Mahi*. Section 4.2 presents a detailed account of how the potential economic benefits of the initiative have been calculated, including an explanation of the 'discount rate' used. Section 4.3 then presents the estimated economic costs, including an allowance for the deadweight cost of taxation. Section 4.4 reports the results of a sensitivity analysis, examining the impact of changing key assumptions in the cost benefit analysis. Section 4.5 summarises the main result of this analysis, which is found to be robust after the sensitivity analysis: the estimated potential economic benefits are several times larger than the estimated economic costs.

#### 4.1 The counterfactual

The *Guide to Social Cost Benefit Analysis* explains that the counterfactual is the situation that would exist if a policy does not go ahead (Treasury, 2015, p. 9). In this case, the counterfactual can be derived from the intervention logic that led to the funding of the *He Toki ki te Mahi* initiative. This is described in Savage *et al.* (2016, p. 19):

While the Canterbury earthquakes devastated the region they also inspired the revitalisation of Māori trade training in Christchurch. In 2011, a partnership between Hawkins Construction, Ngāi Tahu and the Christchurch Polytechnic Institute of Technology (now Ara) successfully developed a pre-trade Māori trade training initiative, 'He Toki ki te Rika.' The success of the pre-trade initiative has seen several hundred young Māori graduate into the construction workforce.

Unfortunately, many He Toki ki te Rika graduates found it difficult to secure an apprenticeship and were forced to find work as labourers. The governance board of He Toki ki te Rika could see the need for ongoing apprenticeship support. In 2014 the He Toki ki te Mahi Trust was created as a Group Training Scheme specifically designed to support Maori construction apprentices.

Consequently, the assumed counterfactual is that in the absence of *He Toki ki te Mahi*, the participants would gain no economic benefit from their participation in the *He Toki ki te Rika* programme, but would return to their previous industry and associated career path of a person with an upper secondary school qualification. A person who entered from employment in the agriculture industry, for example, is assumed to have returned to the dashed income path in Figure 3.2 at the end of Chapter 3.

For the ten people who entered from school and for the two people whose previous situation was not recorded, there is no information available about the industry they would have chosen for employment in the absence of the two programmes. To keep the analysis conservative, it is assumed that they would have been employed in the construction sector, so that the school leavers get no benefit unless they complete an apprenticeship.

For the two people who were not in employment, education or training, it is assumed that this status indicates a low level of productivity. Hence the assumed counterfactual in these two cases is they would have found employment in the lowest productivity industry in the study, which was the retail and hospitality industry.

Finally, ten people have left the programme with no record available of their current work situation. These people are assumed to have no economic benefits from their participation and are not included in the analysis of this chapter.

## 4.2 The estimated potential economic benefits

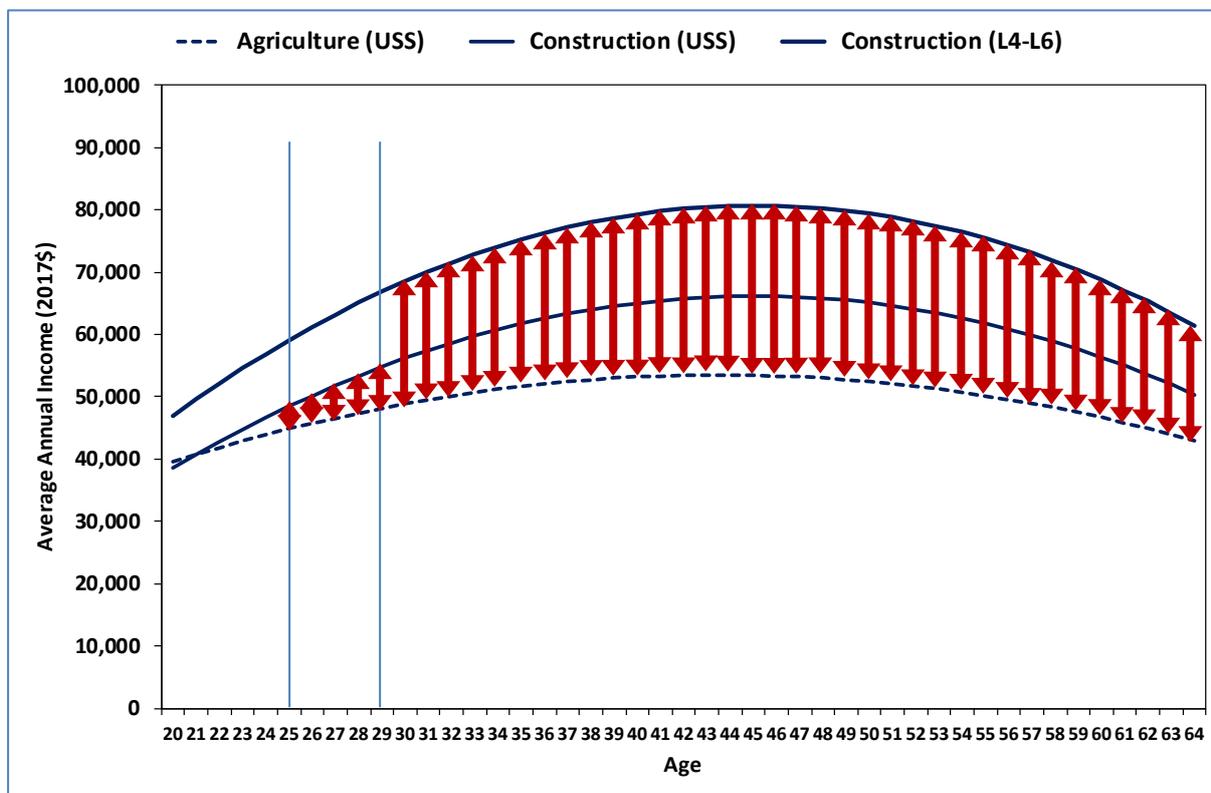
The 39 participants analysed in this chapter can be grouped into five categories of participants, with only three of the groups contributing to the estimated potential economic benefits.

- 7 entrants had already been employed, or are assumed to have been able to obtain employment, in the construction industry and continue to be employed in this industry. This group remain on the same income path as in the counterfactual and so the analysis records no economic benefits for this group.
- 4 participants have moved on to further education, or have returned to their former status of being not in employment, education or training. This group is assumed to remain on the same income path as in the counterfactual. Again, the analysis records no economic benefits for this group.
- 8 participants were previously employed in other industries and are now employed in the construction industry; hence this group is on a higher income path.
- 11 participants were already employed or assumed to have been able to obtain employment in the construction industry but are now engaged as apprentices in the construction industry; hence this group is on their way to a higher income path.
- 9 participants were employed in other industries but are now engaged as apprentices in the construction industry; hence this group is on their way to a higher income path.

The potential economic benefits come from the 28 participants who are on or moving towards a higher income path. Based on their recorded age in 2017, it is possible to calculate for the remaining years of their working life the difference between their current income path and their income path assumed in the counterfactual. For those engaged as apprentices, the apprenticeship is assumed to take four years, after which they move on to the top income path shown in Figure 3.2 of the previous chapter.

Figure 4.1 provides an illustration based on a person entering the programme from the agriculture industry at the age of 25. The participant is immediately engaged as an apprentice in the construction industry, and so moves up to the Construction (USS) income line. The apprenticeship takes four years, after which the participant moves up to the Construction (L4-L6) income line. The double-arrows shows the economic benefits in each year.

**Figure 4.1: Illustration of the economic benefits**



Note: The participant is assumed to enter the programme from agriculture at age 25 and is engaged as an apprentice in construction, graduating after four years.

Two observations can be made about the example in Figure 4.1. Because the intervention is targeting young people, the economic benefits continue for a long time, up to 40 years. Hence the total benefits to a participant are substantial. Second, larger gains come from successful completion of the apprenticeship to move from the Upper Secondary School income pathway to the Level 4 to Level 6 income pathway. *He Toki ki te Mahi* has not been running for long enough to obtain any information on its completion rates. This is why the analysis refers to the initiative’s *potential* economic benefits.

To calculate the total net present value of these benefits, it is necessary to determine a suitable discount rate, acknowledging “that most people would prefer receiving a dollar today over receiving a dollar in a year’s time” (Treasury, 2015, p. 34). This preference is linked to interest rates earned on savings, and so the discount rate is set to reflect current interest rates and the risks of social investment of this nature. The discount rate recommended by Treasury (2016) is 6 per cent, which is the rate used in this study.

Based on these assumptions, the total net present value of the potential economic benefits at 30 June 2017 is calculated by the AERU to be above **\$5,500,000**.

Table 4.1 explains the contribution that comes from each of the two mechanisms. The shift of participants from other industries to the construction industry produces a net present value of economic benefits equal to \$2,250,123. The completion of apprenticeships by participants currently engaged in that position adds a further \$3,336,395 to the net present value.

**Table 4.1: Sources of the potential economic benefits**

<b>Year Ending June</b>	<b>Non-Apprentice Participants</b>	<b>Apprentice Participants</b>	<b>Totals</b>
Shift to the Construction Industry	\$1,324,307	\$925,816	<b>\$2,250,123</b>
Completion of an Apprenticeship	-	\$3,336,395	<b>\$3,336,395</b>
<b>Totals</b>	<b>\$1,324,307</b>	<b>\$4,262,211</b>	<b>\$5,586,518</b>

### 4.3 The estimated economic costs

The estimated economic costs for the initiative are set out in Table 4.2. The analysis is based on years ending in June because the contract for *He Toki ki te Mahi* was signed on 10 May 2015 and the first payment was made on 24 July 2015 (Savage *et al*, 2016, p. 10). The AERU was advised that funding for the initiative was \$250,000 in the first twelve months and \$80,000 in the second twelve months. Based on this advice, the analysis assumes set-up costs of \$170,000 and annual operational costs of \$80,000.

All of the fixed costs are assigned to the current cohort of participants, although it is hoped that the initiative will continue to operate with new entrants as time proceeds. This represents another conservative assumption in the analysis.

The current cohort of participants will need further support until they complete their apprenticeships. The most recent seven participants, for example, are in the first year of their apprenticeships and so will not complete their studies until 2020/21. Table 4.2 therefore allows for four more years of funding at \$80,000 per year. This funding would allow more participants into *He Toki ki te Mahi*, but this positive effect is not included in the analysis (another conservative assumption).

**Table 4.2: Current cohort participants and funding, 2015/16 – 2019/21**

Year Ending June	Current Cohort Participants	Funding
Set-up Costs (2015/16)	-	\$170,000
2015/16	4	\$80,000
2016/17	13	\$80,000
2017/18	20	\$80,000
2018/19	20	\$80,000
2019/20	16	\$80,000
2020/21	7	\$80,000
	<b>Total Funding</b>	<b>\$650,000</b>
	Plus 20% Deadweight Loss	\$130,000
	<b>Total Economic Cost</b>	<b>\$780,000</b>

Note: Current cohort participants are calculated assuming that each apprenticeship takes four years to complete. There are 20 apprentices in the programme at 30 June 2017; 4 of these started before July 2015 and are modelled to finish by June 2019; 9 started between July 2015 and June 2016 and are modelled to finish by June 2020. The remaining 7 participants are modelled in finish by June 2021.

On these assumptions, the total amount of public funding in the initiative connected to the current participants is \$650,000.

These funds are financed from general taxation. It is recognised in the economics literature that “taxes encourage people to move away from things that are taxed and toward things that are not taxed” (Treasury, 2015, pp. 15-16). Taxes on income, for example, discourage effort to earn income, which is an example of “the deadweight loss of taxation” (ibid).

The New Zealand Treasury therefore recommends that a cost benefit analysis should allow for this deadweight loss by adding 20 per cent to project costs funded from general taxation (Treasury, 2015, p. 15). This adds a further \$130,000 to the costs in Table 4.2.

Based on these assumptions, the total net present value of the economic costs associated with participants at 30 June 2017 is calculated by the AERU to be **\$780,000**.

This cost is well below the estimated net present value of potential economic benefits in Table 4.1 (above \$5.5 million). Thus the *He Toki ki te Mahi* initiative is producing potential economic benefits beyond its costs.

The costs of \$0.78 million are also well below the net present value of benefits resulting from participants shifting from other industries into the high productivity construction industry (\$2.25 million). These benefits do not depend on completion rates, which means that the positive conclusion of the analysis is robust, as the following section confirms.

#### 4.4 Sensitivity analysis

The cost benefit analysis reported in sections 4.3 and 4.4 suggest that the net potential economic benefits of the *He Toki ki te Mahi* initiative is \$5,500,000 - \$780,000 = \$4,720,000.

The final step in a cost benefit analysis is to reflect on whether the assumptions in the analysis have unintentionally incorporated an 'optimism bias', leading to overestimation of future benefits or underestimation of costs (Treasury, 2015, p. 31). The alternative is to consider pessimistic scenarios to understand the sensitivity of the result to key assumptions.

Table 4.3 therefore lists the key assumptions in the cost benefit analysis, and categorises them as conservative or optimistic. Two assumptions are identified as optimistic.

The first is that all participants who complete the apprenticeship are assumed to follow the income path for holders of a Level 4 to Level 6 certificate or diploma. This assumption is necessary because the data source provides information about Levels 4 to 6 as a single group, but it should be recognised that the initial qualification of a person completing an apprenticeship is Level 4. This assumption is balanced by the conservative assumption that all entrants have an upper secondary school highest qualification. In fact, most entrants are likely to have no qualification beyond lower secondary school.

The second optimistic assumption is that all participants engaged in an apprenticeship complete this qualification. This is the hope of the He Toki ki te Mahi Trust, but the completion rate for the programme is currently unknown. The programme is working with employers and well as trainees in this objective, which is in line with best practice for this type of intervention (Dalziel and Saunders, 2014, pp 58-59). Nevertheless, it is unlikely that the completion rate will be 100 per cent, which is why this analysis has always referred to *potential* economic benefits.

It is possible to test the sensitivity of the results to this assumption by assuming different completion rates for the apprentices. To set a context for this sensitivity analysis, note that the Ministry of Education publishes data on the percentage of apprentices who complete a qualification (or a higher qualification) in the period following their initial enrolment.<sup>7</sup> These data are analysed by ethnicity, reproduced in Table 4.4 below. They show that in the last five years, the completion rates of Māori and Pasifika apprentices after four years have been between 32 and 43 per cent.

Consequently, the AERU calculated the net present value of economic benefits for different completion rates ranging from 20 per cent to 80 per cent. In each case, this was done by assuming that a participant who did not complete an apprenticeship remained employed in the construction sector but earned the income of someone with an upper secondary school highest qualification. The economic benefit for each apprentice was then calculated as the weighted average of the two possible income paths (highest qualification of USS or Levels 4-6), with the weight determined by the assumed completion rate. The results are shown in Figure 4.2.

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<sup>7</sup> [https://www.educationcounts.govt.nz/statistics/tertiary-education/retention\\_and\\_achievement](https://www.educationcounts.govt.nz/statistics/tertiary-education/retention_and_achievement).

**Table 4.3: Categorisation of conservative and optimistic assumptions in the analysis**

<b>Conservative Assumptions</b>	<b>Optimistic Assumptions</b>
All entrants are assumed to have an upper secondary school highest qualification, but most are likely to have no qualification beyond lower secondary school.	All participants who complete the apprenticeship are assumed to follow the income path for holders of a Level 4 to Level 6 certificate or diploma, but their initial qualification is Level 4.
All entrants from school are assumed to have been able to find employment in the construction sector, but some are likely to have been employed in lower productivity industries or become unemployed.	All participants engaged in an apprenticeship are assumed to complete this qualification, but the completion rate for the programme is unknown.
All participants who have left the city or otherwise disengaged from the initiative are assumed to have received no economic benefits from their participation, but some are likely to have gained some skills.	
All participants who have left to enrol in alternative higher education are assumed to have received no economic benefits from their participation, but it may have been a key stepping stone to their new career.	
The length of time completing an apprenticeship is assumed to be 4 years, which is at the top of the BCITO estimate of a typical length of 3-4 years.	
The full set-up costs have been attributed to the current cohort of participants, but it is hoped that the initiative will continue into the future, with more participants enrolling as time proceeds.	
Full costs for the programme over the next four years are included in the analysis, but some of these costs will be incurred in assisting new entrants, who are not included in this analysis.	

**Table 4.4: Percent of apprentices completing a qualification by ethnic group, 2007 - 2016**

	Year Person First Started as an Apprentice	After 1 year	After 2 years	After 3 years	After 4 years	After 5 years	After 6 years	After 7 years	After 8 years	After 9 years	After 10 years
European	2006	6	10	18	32	48	54	57	58	59	59
	2007	2	6	13	32	46	52	55	56	57	58
	2008	2	9	21	35	50	56	58	60	60	
	2009	4	16	26	39	52	56	58	59		
	2010	5	14	25	41	53	59	61			
	2011	9	21	32	48	61	67				
	2012	7	20	33	49	61					
	2013	8	21	31	46						
	2014	6	16	26							
	2015	11	22								
	2016	5									
Māori	2006	3	7	14	24	33	37	39	40	40	41
	2007	2	6	14	25	32	35	37	38	38	39
	2008	2	10	21	29	39	43	45	45	46	
	2009	4	13	21	32	39	42	43	43		
	2010	4	11	21	34	42	45	47			
	2011	6	17	29	43	52	55				
	2012	5	16	29	40	48					
	2013	7	19	29	39						
	2014	5	13	21							
	2015	9	18								
	2016	5									
Pasifika	2006	3	6	12	24	35	39	42	44	45	45
	2007	1	6	16	27	34	41	42	42	43	44
	2008	2	8	19	27	35	38	41	41	42	
	2009	4	14	22	33	41	43	43	44		
	2010	6	14	24	34	42	44	45			
	2011	3	15	26	40	46	50				
	2012	4	14	22	34	41					
	2013	7	14	23	37						
	2014	6	14	21							
	2015	6	14								
	2016	5									

Note: Completion rates are for a qualification at the same level as, or higher than, the one enrolled in.

Source: Education Counts website, Achievement in Industry Training spreadsheet, page ITA14, accessed 21 August 2017 at

[https://www.educationcounts.govt.nz/statistics/tertiary-education/retention\\_and\\_achievement](https://www.educationcounts.govt.nz/statistics/tertiary-education/retention_and_achievement).

**Figure 4.2: Sensitivity analysis of benefits compared to costs for different completion rates by apprentices**

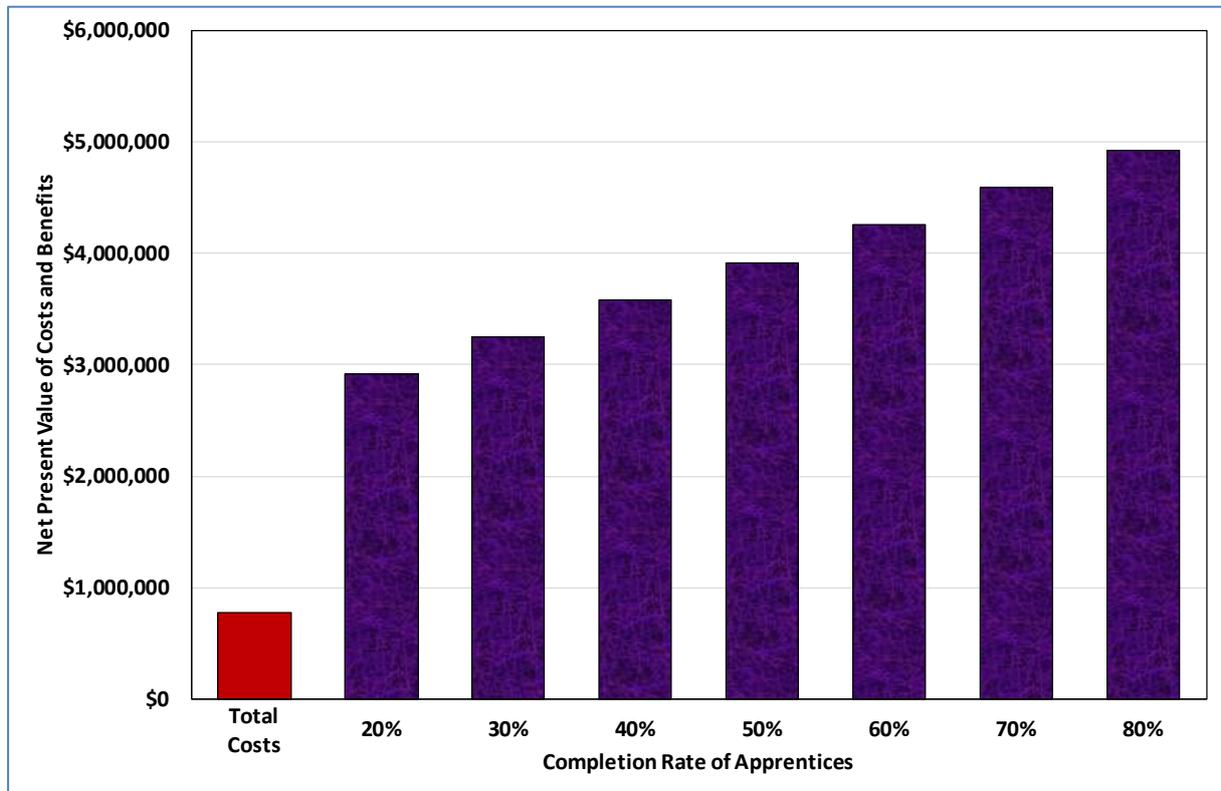


Figure 4.2 shows that in all cases the *He Toki ki te Mahi* initiative covers its costs by a factor of three to five times. The AERU has not attempted to quantify its conservative assumptions listed in Table 4.3 above, but in each case the impact is either to underestimate the benefits or to overstate the costs. Hence the fundamental conclusion of the analysis is robust.

## 4.5 Conclusion

The cost benefit analysis of the *He Toki ki te Mahi* initiative reported in sections 4.2 and 4.3 calculates that the potential economic benefits outweigh the economic costs by a factor above 7 to 1. Total potential economic benefits are above \$5,500,000 and total economic costs are \$780,000. The analysis is an illustration of the power of a successful intervention in a young person’s life; in this case, the initiative has the potential to increase the lifetime earnings of 28 young people, 20 of whom will move on to a significantly higher income path when they complete their apprenticeship.

The sensitivity analysis in section 4.4 indicates that the results from the cost benefit analysis are robust. The *He Toki ki te Mahi* initiative is delivering economic benefits above the costs of its public funding. These benefits are being produced by some of the participants shifting from other industries to the relatively high productivity construction industry and from some participants gaining higher level skills as a result of engaging in apprenticeships.

It is likely that the benefits considered in this analysis will ripple out through whānau, both in the present and in the future. This is a consequence of success in the Whānau Ora goal of whānau being “economically secure and successfully involved in wealth creation” (see section 1.1. above). The AERU has not attempted to quantify these ripple effects, which reinforce the conclusion that considerable value is being created through this initiative.

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