MĀORI ECONOMIC TASKFORCE

Kotahitanga Te Reo Wairuatanga
Kaitiakitanga Ukaipotanga Whakapapa
Pukengatanga
Rangatiratanga Manaakitanga
Whanaungatanga

THE MĀORI ECONOMY, SCIENCE AND INNOVATION

Te Puni Kōkiri
REALISING MĀORI POTENTIAL

berl economics

Authors

This report was prepared by:

Dr Ganesh Nana – BERL Chief Economist
Fiona Stokes – BERL Economist
Wilma Molano – BERL Research Economist

Acknowledgements

BERL wish to thank the people and organisations who provided data and related information on their activities to help construct this picture of the Māori economy.

We also wish to thank the Secretariat of the Māori Economic Taskforce and Te Puni Kōkiri for their contribution and assistance during the compilation of this report.

The authors acknowledge the contributions, help and support of colleagues Kel Sanderson (Director) and Amanda Lynn (General Manager), and former staff member Rawinia Kamau during this project.

Final responsibility for the content of this document and the output of this project; however, lies solely with BERL.

Contents

4		**Executive summary**
8	1	**Introduction**
9	2	**Setting the scene**
9	2.1	The various dimensions of the Māori economy
12	2.2	Science, innovation and the Māori economy
13	2.3	Looking ahead towards 2061
16	3	**The magnitude of potential benefits and costs**
16	3.1	Scenarios to be modelled
17	3.2	Summary of scenario results
18	3.3	Improved productivity scenario
21	3.4	Improved export effort scenario
24	3.5	Investment focus scenario
26	3.6	Doing nothing scenario
28	4	**Putting it together**
28	4.1	The foundation
28	4.2	The policy lens
29	4.3	The Māori scene
30	4.4	The science scene
30	4.5	Labour skills, education and training are also central
31	4.6	What next?
32	5	**Concluding comments**
32	5.1	A story
34	5.2	Last words
35	6	**Glossary**
38	7	**References**

Tables

9 Table 2.1 Asset base of 2010 Māori economy (2010 $m)
19 Table 3.1 Increased productivity scenario – difference from baseline
22 Table 3.2 Improved export effort scenario – Difference from baseline
25 Table 3.4 Investment focus scenario – Difference from baseline
27 Table 3.5 The do nothing scenario – Difference from baseline

Figures

10 Figure 2.1 Value added of Māori enterprises by sector (2010 $bn)
11 Figure 2.2 GDP from the Māori economy – the production dimension
12 Figure 2.3 GDP from the Māori economy – the income and expenditure dimensions
18 Figure 3.1 Difference in Māori GDP compared to baseline
20 Figure 3.2 Increased productivity scenario - Gain in 2061 Māori GDP by sector
23 Figure 3.3 Investment focus scenario – Māori GDP difference from baseline
24 Figure 3.4 Improved export effort scenario - Gain in 2061 Māori GDP by sector
26 Figure 3.5 The do nothing scenario – Māori GDP difference from baseline
32 Figure 5.1 Schematic of innovation effort and the NZ economy
33 Figure 5.2 A closer alignment
33 Figure 5.3 But, what if...

Executive summary

There are potential benefits and opportunity costs for the Māori economy in relation to its effective or ineffective engagement and alignment with the nation's science and innovation effort. This report summarises scenarios modelled to demonstrate potential benefits (or costs) to the Māori economy, as well as to the wider NZ economy, over the period to 2061.

The four scenarios modelled are:

1. **Increased productivity scenario**

   The level of productivity in the Māori economy is lifted to be the same as the national average across all industries by 2061.

2. **Improved export effort scenario**

   An export-focused innovation of sales and marketing effort of the products and services from the Māori economy is modelled. This scenario can also be viewed as encompassing the development of new and modified products and services, and the successful development and marketing domestically and internationally of new 'brands'. Consequently, world demand for export products from New Zealand grows across a range of industries such as agriculture – dairy and meat products; forestry – logs and wood products; fish – fish and aquaculture products; tourism; education; and other services.

3. **Investment focus scenario**

   More science and research investment is directed towards the Māori economy, but this investment is not accompanied by application to increasing productivity, or to the development of new products, processes or markets. Additional capital accumulation occurs, but the lack of genuine engagement between Māori and the science and innovation sector sees an absence of the commercialisation of the innovation efforts.

4. **Doing nothing scenario**

   The 'doing nothing' scenario assumes the "running down" or devaluing of the asset base of the Māori economy, due to a lack of maintenance in the absence of sufficient income and investment funds arising from existing assets.

Findings from the four scenarios are summarised below, key points to be stated include:

- the 'doing nothing' scenario reveals high opportunity costs (in the economic as well as cultural and social sense) and few benefits.
- success in either productivity increases or improved export effort yield substantial benefits.
- a focus on investment in science and innovation that is not matched by the application and/or commercialisation of such effort results in only marginal gains.
- scenarios showing gains to the Māori economy also show value to NZ Inc, through gains in national GDP, employment and wider economic benefits.

Overall, the modelled outcomes provide compelling evidence of the potential, opportunities and value of aligning the science and innovation effort with the requirements of the Māori economy. They also provide compelling evidence that investment and effort in science and innovation can provide growth opportunities for the Māori and the New Zealand economies.

The scenarios also highlight the 'step change' difference between science and innovation policy that is concentrated solely on funding the science sector, as opposed to an effort that focuses on overcoming the communication, capability, and commercialisation challenges faced by potential scientists, innovators and Māori entrepreneurs. A much greater return on investment is

obtained through active engagement and alignment, as opposed to a focus solely on funding.

However, the need to improve the links between commercial enterprises and the science sector is not a new argument, and the story of consequential improved productivity and profitability is equally widely known.

Our argument though, is that Māori enterprises are uniquely positioned, and have a set of characteristics that means the story does not (and, indeed, must not) stop at increased science funding. The combination of assets held over a range of governance and management structures, with varying degrees of scale, capacity and capabilities, suggests potentially greater returns, but also significant costs if a 'do nothing' choice is made now.

In many instances the need for changes to governance and/or management structures is evident. Difficulties in making decisions due to inability to communicate with the many stakeholders in a Māori entity may cause some to default to a 'do nothing' decision. However, the opportunity costs of doing nothing and seeing the asset run down or devalue, are too high for these assets to continue to underperform.

Legislation changes may need to occur to facilitate these changes and this project provides the quantitative evidence to spur such changes.

Enhancements in governance, management, communications and capabilities can also arise through collaboration with exemplar enterprises in the Māori economy. Such collaboration may also open opportunities to enjoy benefits from scale. However, maintaining the independent identity of owners and beneficiaries of particular assets means such collaboration is likely to require skilful management.

For these returns to be realised:

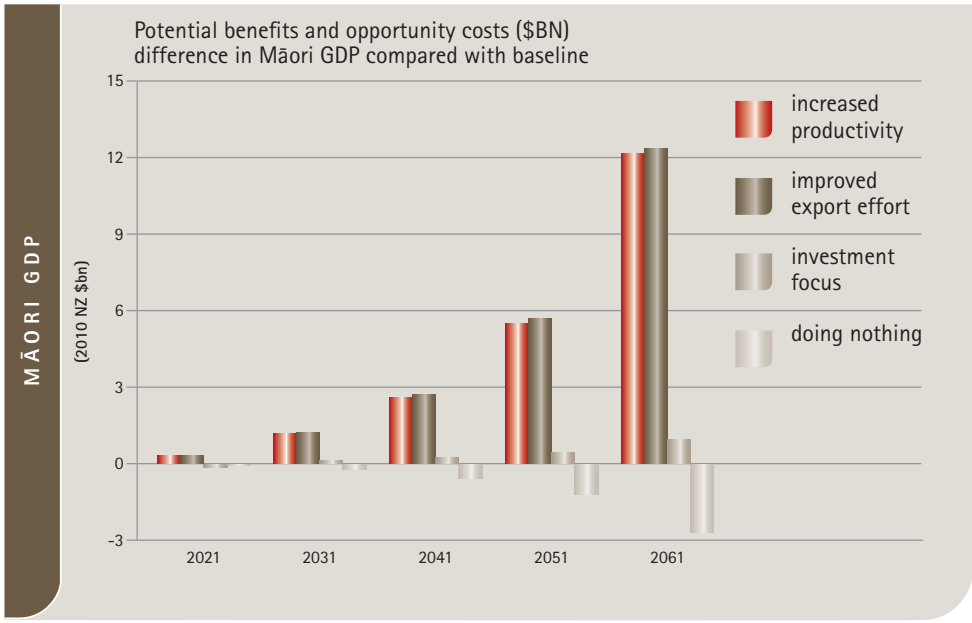
- our focus needs to extend to a genuine engagement between Māori enterprises and the science and innovation sector.
- the challenges, whether requiring legislative or attitudinal changes, are significant. They call for skilful leadership, the development of long-term relationships and collaborative efforts to capture gains from capacity and capability improvements, as well as from the economies of scale.
- the opportunities require a long-term investment, effort and engagement with science and innovation.
- long-term investment and effort in developing skills and capabilities of labour force is also critical.

Increasing the performance of, and income and contribution from, the Māori economy is critical to ensuring the economic asset base is not eroded. Such increased income is also critical to the development and kaitiakitanga of the cultural, social, community and environmental assets and values of Māori and all other New Zealanders.

Scenario findings summary

In the first scenario the level of productivity in the Māori economy is lifted to be the same as the national average across all industries by 2061. This scenario results in:

- GDP from the Māori economy in 2061 being $12.1bn higher than that in the baseline
- an additional 148,000 job opportunities in 2061.



In the second scenario, an export-focused innovation of sales and marketing effort of the products and services from the Māori economy is modelled. This scenario can also be viewed as encompassing the development of new/modified products and services and/or possible 'brand'. This scenario results in:

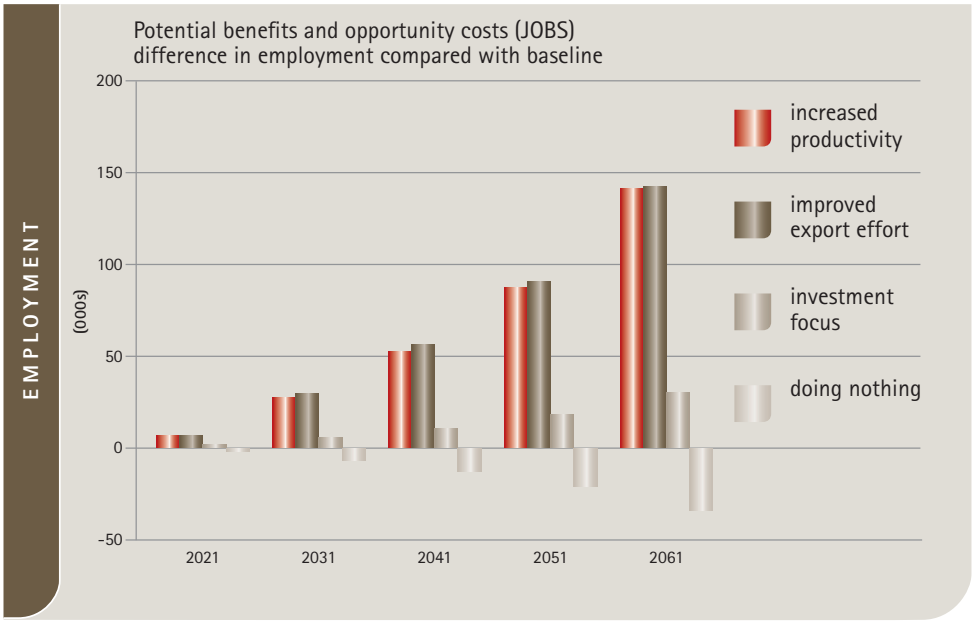
- GDP from the Māori economy in 2061 being $12.3bn higher than that in the baseline
- an additional of 149,600 job opportunities in 2061.

In the third scenario more science and research investment is directed into the Māori economy, but this investment is not accompanied by the application to increasing productivity, or to commercialisation developing new products or new markets. Some additional capital is accumulated, but productivity levels and the customer focus of businesses remains as in the baseline. The results of this scenario are:

- GDP from the Māori economy in 2061 is $868m higher than that in the baseline
- an additional 31,000 job opportunities in 2061.

In the fourth scenario, doing nothing sees the "running down" or devaluing of the Māori asset base, due to a lack of maintenance in the absence of sufficient investment funds arising from existing assets. The results from this scenario are:

- GDP from the Māori economy in 2061 is $2.7bn lower than that in the baseline
- 35,000 fewer job opportunities in 2061.



In summary, increased productivity or improved export effort provides job opportunities for close to an additional 150,000 by 2061. In contrast, doing nothing sees job opportunities in 2061 total some 35,000 below the baseline. Thus, the difference between:

- a science and innovation effort with associated leadership and collaboration aimed at unlocking the potential residing in the Māori economy; and
- doing nothing

can be succinctly summarised as 185,000 job opportunities in 2061.

1. Introduction

The Māori Economic Taskforce (MET) commissioned research in late 2009 to undertake a study of the Māori economy and particular challenges facing its future. Specifically, the MET wished us to investigate the potential for the contribution and performance of the Māori economy to be lifted through the application of science and innovation effort.

The study aimed to:

- investigate the potential which exists within the Māori economy and the Māori world and researching the current utilisation and value of Māori enterprises
- describe the innovation that could unlock potential improvements to the value of Māori assets and enterprises and to preserve natural resources Māori have guardianship roles over.
- outline a series of scenarios illustrating the potential return resulting from improved innovation efforts and, conversely, the cost of not engaging in successful innovation.
- signal the future resources (assets, people, skills) required to realise Māori economic development

Further, we were charged with:

- illustrating the changes that investment in innovation can make to Māori enterprises, the Māori asset base, and the Māori and New Zealand economies in 2061
- informing the development of the Māori economy including the asset base, Māori enterprises, and economic activity towards 2061
- exploring opportunities to develop and grow capability at each stage of the innovation process, and the skills and training required to realise the potential of the Māori economy, and its contribution to the New Zealand economy, in 2061.

This project:

1. quantified and assessed the current state of the Māori asset base
2. engaged with a range of stakeholders in the Māori economy and the science and innovation sector to discuss perceptions, attitudes and challenges to a closer alignment and engagement
3. modified the model of the New Zealand economy to explicitly indentify the Māori economy
4. developed of range of scenarios to assess the potential benefits and opportunity costs of the impact of science and innovation on productivity, product mix and value chains.
5. modelled these scenarios and presented the results to a range of workshops before finalising them for this report.

This report:

- aims to inform discussions on the issues, challenges, constraints and potential of the Māori economy given a closer alignment with the nation's science, innovation and R&D effort.
- combines information from earlier outputs from this project, including a preliminary scoping report[1], a discussion document[2] outlining themes and issues canvassed during our conversations with stakeholders, and Asset Base[3] report.
- presents scenario findings.

Section 2 outlines the size and dimensions of the 2010 Māori economy and provides context within which the scenario findings should be read. Section 3 details the scenarios modelled and the findings, while section 4 brings the many issues together. Section 5 provides some concluding comments.

1 BERL (April 2010)
2 BERL (November 2010)
3 BERL (April 2011)

2. Setting the scene

2.1 The various dimensions of the Māori economy [4]

The asset base of the Māori economy is substantial, it has many dimensions, and it is growing. This makes it imperative to illustrate the changes investment in science and innovation can make to Māori enterprises, the Māori asset base, and the Māori and New Zealand economies.

2.1.1 The asset base of the 2010 Māori economy

In 2001 the asset base of the Māori economy was estimated to be worth $9.4 billion, this figure rose to $16.5 billion by 2006, and we now estimate it was worth at least $36.9 billion in 2010.

4 This section provides a brief summary of the asset base numbers. Further details are provided in a separate report – BERL (2011), *The Asset Base, Income, Expenditure and GDP of the 2010 Māori Economy.*

Table 2.1 Asset base of 2010 Māori economy (2010 $m)

	Māori Asset Base 2010 $m			
	Self-employed	Employers	Trusts, Incorporations, Boards, MIOs, PGSEs, Holding Companies	Total
Agriculture			*2,530*	
Forestry			*2,242*	
Fishing			*1,035*	
Total Agriculture, Forestry and Fishing	1,534	3,238	5,807	10,579
Mining	0	0	5	5
Manufacturing	250	1,767	573	2,591
Electricity	0	0	270	270
Construction	397	1,040	0	1,438
Wholesale Trade	93	675	0	768
Retail Trade	98	660	0	758
Accommodation, Cafes & Restaurants	22	289	0	311
Transport and Storage	366	2,439	0	2,806
Communications	323	1,958	0	2,282
Finance and Insurance	112	1,484	0	1,597
Property and Business Services	1,525	4,583	808	6,916
Government	0	0	0	0
Education	41	950	278	1,269
Health and Community Services	39	286	66	391
Cultural, Recreational & Pers Services	269	877	2,813	3,958
Not Elsewhere Included	370	589	0	959
Total	5,440	20,837	10,620	36,897

Source: BERL calculations using data from various sources. Totals may differ from sum of components due to rounding.

The contribution of the Māori economy cannot, however, be summarised by one number or percentage. Nor can we summarise the participation of Māori in the New Zealand economy in only one figure or data point. In line with the brief for this project, we have adopted a broad definition of the Māori economy. We have attempted to capture all entities and enterprises that self-identify as part of the Māori economy, and have not limited ourselves to collectively-owned assets, or those arising from Treaty of Waitangi settlements. We have included Māori entrepreneurs active in individually-owned businesses and/or small to medium enterprises (SMEs), as well as the contribution of Māori employees in terms of wages earned.

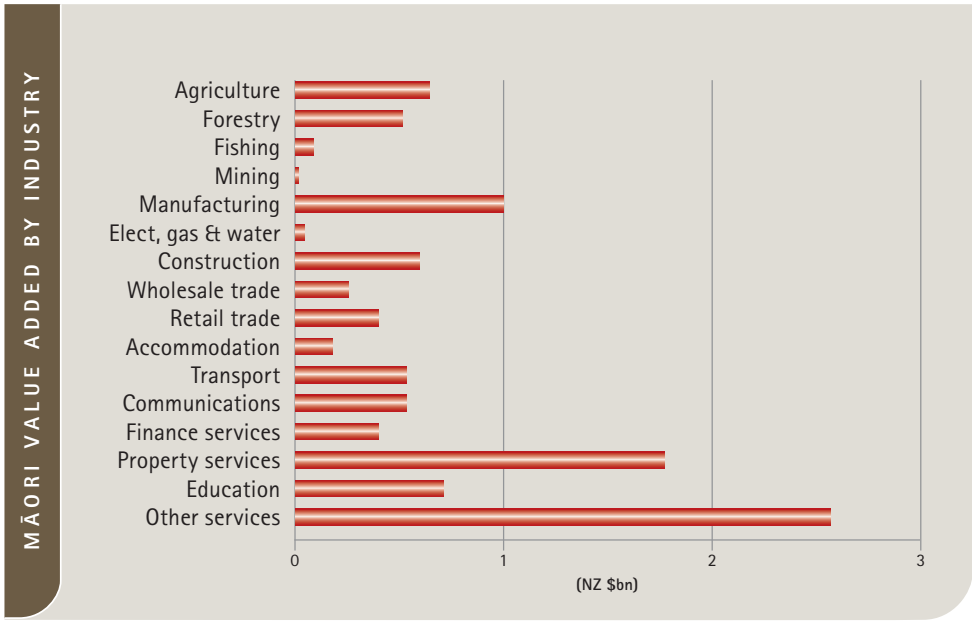
Our estimate of the asset base of enterprises in the 2010 Māori economy therefore comprises:

- $5.4 billion of assets attributable to the enterprises of nearly 12,920 Māori self-employed.
- $10.6 billion of assets of Māori Trust Boards, Māori Land Incorporations and Ahu Whenua Trusts, Post-Settlement Governance Settlement Entities (PSGEs), Mandated Iwi Organisations (MIOs), and Iwi/Rūnanga holding companies.
- $20.8 billion of assets attributable to the enterprises of 5,690 Māori employers.

2.1.2 GDP from the Māori economy

Gross Domestic Product (GDP) is defined as the total market value of all final goods and services produced in a country (or an economy) in a given year.

Figure 2.1 Value added of Māori enterprises by sector (2010 $bn)

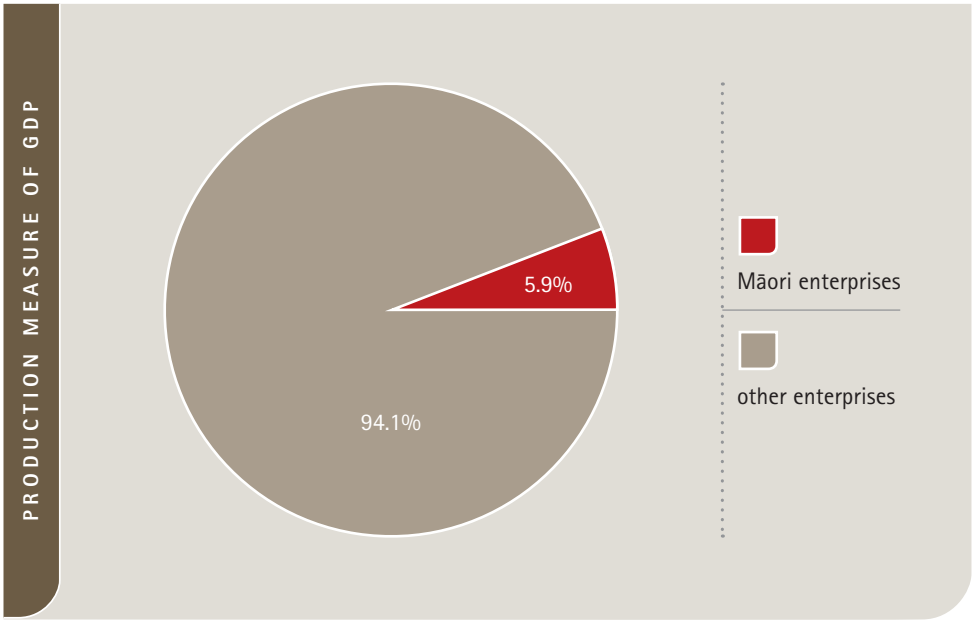


Source: BERL calculations using data from various sources

Our analysis of Māori enterprises indicates that in 2010 these enterprises generated more than $10.3 billion in GDP in New Zealand. Nearly $1.2 billion of this was attributable to Māori enterprises in the agriculture, forestry and fishing sectors, with a further $1 billon attributable to Māori enterprises in the manufacturing sector, including food processing.

As shown in Figure 2.2, this represents 5.9 percent of the total value added arising from all enterprises in New Zealand. This proportion provides a sound indication of the size of Māori enterprises relative to the total production activity of the New Zealand economy.

Figure 2.2 GDP from the Māori economy – the production dimension



Source: BERL calculations using data from various sources

Including other elements of GDP, Māori enterprises generated value added equivalent to 5.5 percent of New Zealand's GDP. This proportion is consistent with those used in earlier reports.[5] It provides an indication of the size of Māori enterprises relative to overall GDP including non-production elements of GDP. The other elements of GDP incorporated in this measure mainly relate to indirect taxes such as GST.

We strongly urge correct interpretation of these proportions. In particular, in using either the 5.9 percent or the 5.5 percent ratios, we do NOT assert that the remaining 94.1 percent or 94.5 percent of GDP arises from non-Māori enterprises. Such an interpretation would be incorrect as there are enterprises for which it is conceptually difficult to assign ethnicity (e.g. finance and banking). It is for this reason we have explicitly used "other enterprises" as opposed to the label "non-Māori".

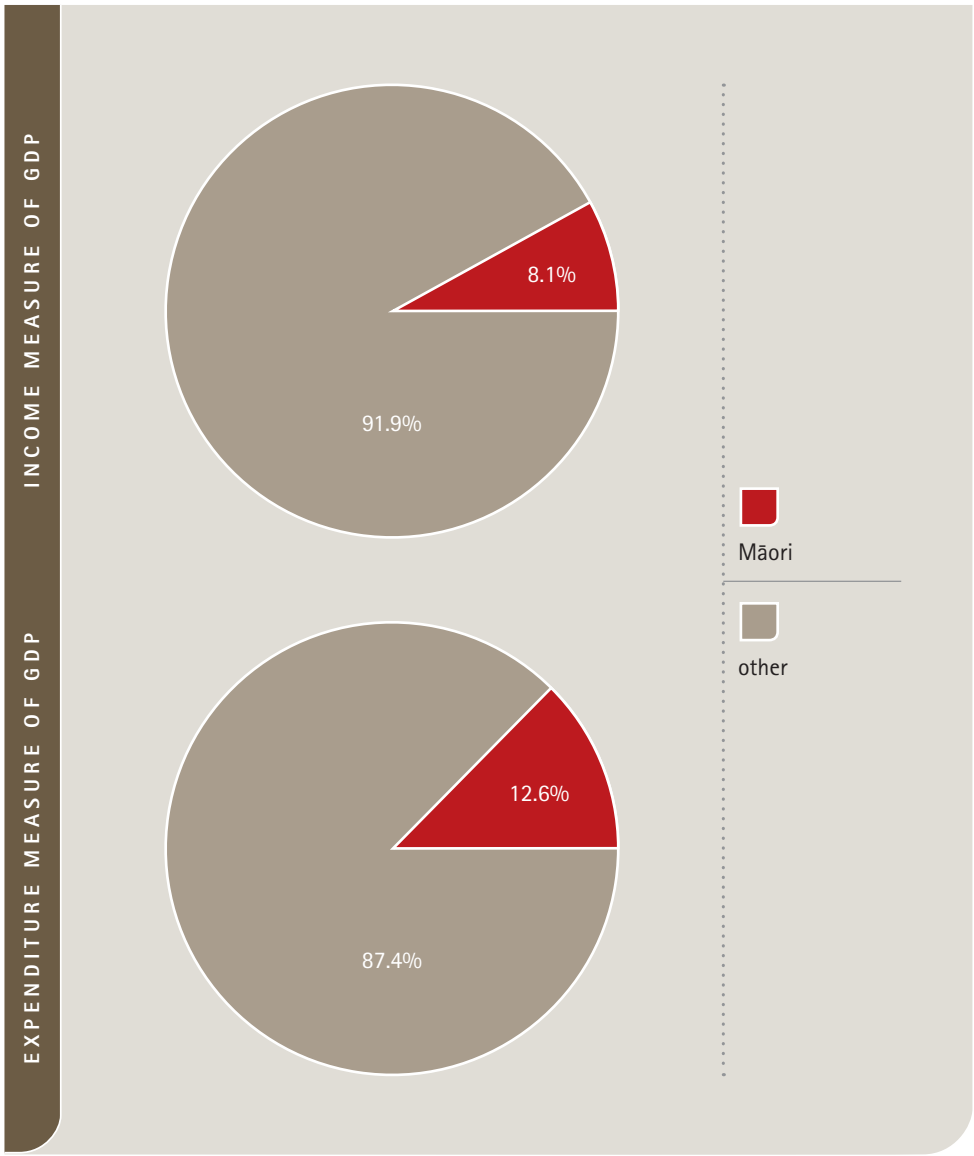
GDP can also be viewed from two other dimensions – namely, income and expenditure.

From an income perspective, the wages and salaries of Māori employers and employees, along with the profit and rental earnings of Māori owners of capital and land, we calculate that Māori GDP for the year to March 2010 to be $13.2 billion. This is equivalent to 8.1 percent of New Zealand's total GDP.

On the expenditure side, we estimate the consumer spending of Māori households and investment spending of Māori enterprises totalled $18.1 billion, representing 12.6 percent of New Zealand's total GDP

5 In particular, consistent with the NZIER 2007 report Māori Participation in the New Zealand Economy. As noted above, refer to BERL (2011) *The Asset Base, Income, Expenditure and GDP of the 2010 Māori Economy* for further details.

Figure 2.3 GDP from the Māori economy – the income and expenditure dimensions



2.2 Science, innovation and the Māori economy

Science and innovation will play a critical role in the future economic development of the asset base of the Māori economy. However, the current science and innovation effort is not delivering the outputs needed to transform the Māori economy. This conclusion was reached through our discussions with stakeholders active in the Māori economy and the science sector.

Currently, communication between Māori entities and the science sector is impeded due to:

- The scope of science and innovation being unclear to Māori entities. Therefore many Māori entities lack an understanding of the science sector and the value it can add.
- The science sector lacks an appreciation of the initiatives currently being undertaken by Māori entities and the consequent potential the science sector could add to advance these.
- Key networks and/or contacts are not known by both parties.
- Communication and engagement methods are often not suitable and/or effective.

There is therefore a need to improve communication and engagement between Māori, between players in the science sector, and between players in the Māori economy and the science sector. It could be argued that some of these themes are not specific to the Māori economy. However, the importance of better communication and engagement between those active in the science sector (or more widely, innovators) and business and industry is noteworthy given the concentration of the Māori economy in land and natural resources. There is an imperative need for players in the Māori economy to understand science and innovation to improve the returns and sustainability of activities in their sectors of interest.

Māori entities are not homogenous and they perceive and handle risk in different ways. The differing sizes, structures, stages of development, levels of expertise, management and governance arrangements, and foci of Māori entities means they do not always lend themselves to science and innovation. Many entities are reluctant to fund science and innovation without seeing a fairly immediate return, and there are a limited number of researchers in leadership positions to prompt entities to get involved in this space.

Some Māori entities have advanced levels of capability and the capacity to engage with science and innovation, while others do not. Where some Māori entities have structures in place to envision the development of their entity beyond the next decade, others remain pre-occupied with the daily concerns of managing routine activities. This theme is important to acknowledge as it has direct impacts on the ability to extract the potential returns from assets, or to consider investment proposals aimed at generating improved returns from assets.

Scale can help to overcome some of the challenges noted. For example, the capability to apply information, the expertise to manage risk, and/or the ability to engage proactively with those in the science sector, may be assisted by the benefits of scale. An associated theme is the potential for Māori entities to collaborate. Again, benefits from collaboration arise from gains attributable to economies of scale. These benefits may also include the ability to capture the income from an asset that may have previously flowed to external players.

Large and small Māori entities recognise that collaboration would be beneficial. However, it is unclear where the driving impetus would come from for the pursuit of this collaboration to succeed. This is particularly challenging given the critical need to preserve iwi identity and the different management foci of Māori entities.

The differing focus of stakeholders – from possession of assets, to ensuring opportunities for whānau, hapu and iwi members, to obtaining a commercial return on investments – and the combination of assets - held over a range of governance and management structures, with varying degrees of scale, capacity and capabilities – implies a multidimensional approach needs to be undertaken to link economic development, science and innovation, and the Māori economy. This multidimensional approach should acknowledge the one theme that transcends all of the above - the value of leadership. Leadership that shows a clear vision, as well as the capability and trust to engage with stakeholders in the Māori economy and science sector, can make a significant difference in the development of an entity and their ability to overcome the challenges noted.

2.3 Looking ahead towards 2061

Towards 2061, there are many scenarios for economic development with energy, food and water supply and demand central to almost all of these issues. On these dimensions alone, New Zealand remains well placed given the resource-based production industries. Nevertheless, there remain challenges as to the sustainability of methods of production and means to mitigate

environmental impacts. In addition, the changing tastes and aspirations of offshore consumer markets could increasingly reward producers focussed on the quality of their offerings, rather than the bulk volume or quantity of products sent to market.

Surrounding these factors is the geopolitical landscape, which is arguably even more dynamic, or at least uncertain. Much has been made of the likely growing influence of China and India in the global picture of the coming decades. However, and of particular relevance to New Zealand, less seems to be made of the rise of other primary producers in central and southern America. The future of the Russian Federation is of relevance from the primary producer, energy supplier and consumer perspective. Amongst these factors lie the large and persistent imbalances in trading positions, which could potentially destabilise international trading relationships. While a return to widespread protectionist policies is considered unlikely, such a scenario should not be dismissed entirely.

The world in which New Zealand enterprises do business over the coming decades will clearly continue to evolve and change, not to mention challenge. Of more certainty, however, is the need to ensure business growth from these enterprises. For Māori enterprises and entities the importance of creating employment opportunities and owning assets will remain central. Other goals may also include the ability to sustainably develop assets, build capital, and allow investment and further development.

In this ever-changing world, investment in science and innovation will be necessary for Māori human capital development, participation in advanced technologies, and productivity growth in the Māori economy. The science and innovation effort - whether it be targeted science investigations, or wider research and development activities - will be critical in attempts to efficiently use, maintain and enhance increasingly scarce and valued resources.

The importance of creating employment opportunities and owning assets will remain an important goal for Māori enterprises. Other goals include the ability to sustainably develop assets, build capital, and allow investment and further development.

More broadly, there are also issues of small uneconomic land holdings and the potential for these holdings to be brought into production, and alternative uses for marginal land. There are significant areas of Māori land – predominantly comprised of small holdings – that are generally considered uneconomical due to a lack of access to water, roading, or other services. These holdings have often reverted to scrub; they may have some patches of grass for a few subsistence livestock or are leased to neighbouring farmers for nominal rent. Often this land has poor governance structures in place or no administration.

Māori are substantial players in the forest industry, and are considering moving into a more active role in the wood processing industry.

Māori are interested in getting involved in different parts of the fisheries value chain such as growing, marketing, processing, transport and logistics, and selling.

Aquaculture is a fast growing sector of the fishing industry. The Government has highlighted the aquaculture sector as a priority area for economic growth and has set a goal for this sector to be a sustainable $1 billion sector by 2025. Currently, approximately 66 percent of New Zealand aquaculture is exported. For this sector to grow, it has been argued, it is important that research and innovation is transferred into successful commercial enterprises that sell seafood products.

Māori are significant players in the aquaculture sector, and this is considered a growth area for many Māori entities. However, the challenge with aquaculture is the large capital investment required to invest in these ventures, and undertake science and innovation related to aquaculture.

Māori entities are passively and actively involved in the exploration and utilisation of natural resources. Passively, they are providing resource access to power generation, exploration and extraction companies, while actively they are involved in providing equity, and undertaking joint ventures and partnerships.

Māori entities are currently involved in this industry, particularly in ironsand mining and aggregates, and there is the potential for greater involvement in petroleum, oil and gas exploration offshore, and mining above and below ground.

The innovation effort (whether it be targeted science investigations, or wider R&D activities) will be critical in attempts to efficiently use, as well as maintain and enhance, increasingly scarce and valued resources.

Māori enterprises are uniquely positioned. Māori enterprises have a combination of assets held over a range of governance and management structures, with varying degrees of scale, capacity and capabilities. This suggests potentially greater returns may arise from a closer alignment between the science and innovation effort and the diverse needs of Māori enterprises. In addition to a closer alignment, the prospect of heightened collaboration between entities active in the Māori economy could enable scale to be reached whereby many more Māori enterprises had both the capacity and capability to engage in a truly two-way relationship with players central to the innovation effort.

In other words, it is not just gains from scale from collaboration that can be pursued. Nor is it just an increased commercial focus for our innovation effort that is in prospect. Rather, it is maximising the ability for Māori enterprises to contribute directly and indirectly with the innovation effort that is the goal. And in turn spur on additional opportunities that lie outside the current asset base of the Māori economy.

Such a perspective adds even more to the potential income that undoubtedly resides in the Māori economy – as well as the wider New Zealand economy.

These considerations form the context for the potential scenarios of the development of the Māori economy discussed in the next section.

3. The magnitude of potential benefits and costs

3.1 Scenarios to be modelled

Taking 2061 as an endpoint, four modelled outcomes have been produced using the BERL Computable General Equilibrium (CGE) model. The modelled outcomes illustrate the potential benefits or opportunity costs of the Māori economy engaging with the nation's science and innovation effort. We term these modelled outcomes, scenarios.

Each modelled outcome has a different set of assumptions. These assumptions include influences on the economic environment, such as productivity, world prices and demand, and the size, composition and management of the asset base of the Māori economy. Assumptions were also considered regarding the responses of players in the Māori economy and science sector to the challenges and issues discussed earlier such as the non-homogeneity of Māori entities and enterprises, their risk aversion, stage of development and scale of operations. The modelled outcomes also reflect assumptions regarding the creation of economies of scale and collaborative ventures. Population demographics, the availability of labour, and human capital requirements such as skills, training and qualifications are also considered as the model requires capital and labour.

At the broadest level, the context for this project is encompassed by the prospects for the New Zealand economy and the influences arising from global developments. As such, there are a range of scenarios that we could consider. Arising from the information compiled in our discussion document the following scenarios options were chosen for modelling:

1. **Increased productivity scenario**

   The level of productivity in the Māori economy is lifted to be the same as the national average across all industries by 2061.

2. **Improved export effort scenario**

   World demand for export products from New Zealand grows across a range of industries such as agriculture – dairy and meat products; forestry – logs and wood products; fish – fish and aquaculture products; tourism; education; and other services.

3. **Investment focus scenario**

   More science and research investment is directed into the Māori economy, resulting in capital accumulation but not application to lifting productivity or commercialising into new products or new markets.

4. **Doing nothing scenario**

   A 'doing nothing' assumption is applied and the model is used to simulate the changes in various economic measures due to "running down" or devaluing the Māori asset base.

All of these scenarios are compared to a baseline, or business as usual (BAU), scenario for 2061.

3.1.1 Business as usual

In order to measure the effect of these scenarios a baseline or 'business as usual' benchmark needs to be set. This scenario is known as a comparator and is the outcome against which we compare the results of assumed changes in behaviour or economic activity.

In the business as usual situation, national GDP steadily increases from $187 billion in 2010 to $1.1 trillion (measured in 2010 values) in 2061. GDP in the Māori economy increases at a slightly lower rate growing by 3.5 percent per annum from 2010 to 2061 to sit at $56.7 billion. During this time, employment grows between 1.0 and 0.9 percent per annum resulting in a million more people in employment in 2061. This employment growth is fairly evenly distributed across the occupation groups examined.

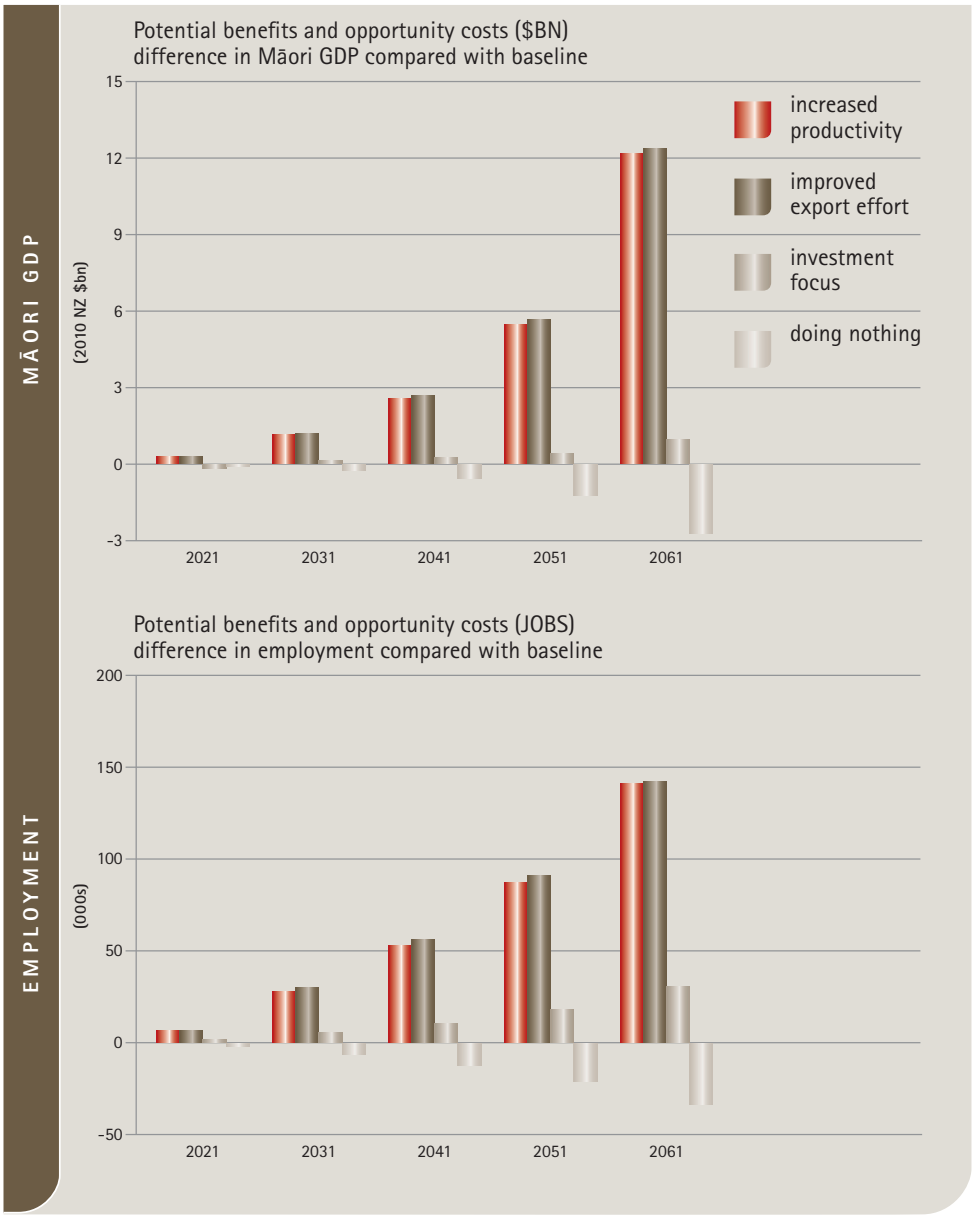
This growth is based on an assumption that world growth and the demand for New Zealand exports continues to expand at historic averages. Further, the level of productivity in sectors of the Māori and New Zealand economy continue to improve at their historic averages.

3.2 Summary of scenario results

Primarily the potential benefits or opportunity costs can be illustrated through gains in national Gross Domestic Product (GDP) and employment. The charts below show for each of the snapshot years the difference from the baseline (BAU) generated by the scenarios in terms of additional employment or GDP.

In summary:

- the 'doing nothing' scenario reveals high opportunity costs (in the economic as well as cultural and social sense) and few benefits.
- success in either productivity increases or improved export effort yield substantial benefits.



- while the increased productivity and improved effort scenarios yield similar benefits at the macro level, there are significant distinctions at the industry and occupation levels that are discussed below.
- a focus on investment in science and innovation that is not matched by the application and/or commercialisation of such effort results in only marginal gains.
- there is a need for a step change to lift both the Māori economy and the New Zealand economy. This requires extending our minds beyond the current thinking and situation.
- realising potential requires transcending the current political environment.
- scenarios showing gains to the Māori economy also show value to wider NZ Inc, through gains in national GDP, employment and wider economic benefits.

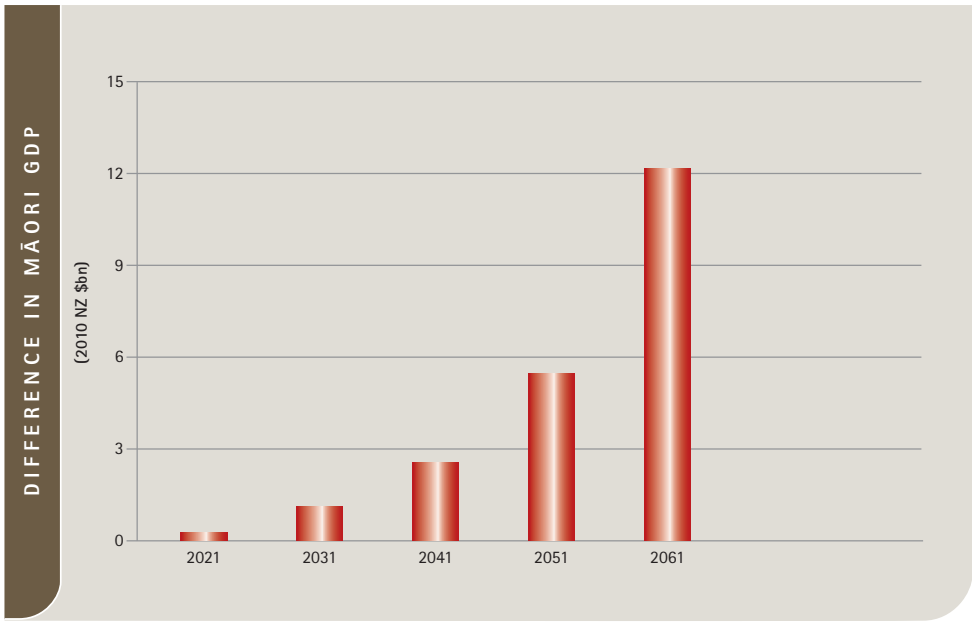
3.3 Improved productivity scenario

In the first scenario the level of productivity in the Māori economy is lifted to be the same as the national average across all industries by 2061.

- This results in GDP from the Māori economy being $12.1 billion higher than the baseline in 2061 and an additional 148,000 job opportunities.
- This is a significant increase in GDP, and is the second largest increase in GDP in the Māori economy in the scenarios examined.

This lift in productivity results in productivity in the Māori economy growing faster than the rest of the economy due to noticeable productivity changes in industries such as agriculture and forestry. This is largely due to an increase in the productivity of currently under utilised Māori land. Under this scenario, there has been a 30 percent productivity improvement on marginal land, and many entities in the Māori economy have moved from being passive rent-takers or landowners to active developers and participants in economic activity.

Figure 3.1 Difference in Māori GDP compared to baseline



Source: BERL calculations using CGE model and data from various sources

Investment in new processes and products, and market research into customer needs has also lead to New Zealand entering new markets. Expansion in existing markets has occurred due to an increase in the volume of products and services on offer and an increase in marketing activities. Under this scenario, there is an improvement in the trade balance, as earnings from exports rise faster than import payments.

Compared to baseline figures, export volumes are 7.3 percent higher in 2061 under the increased productivity scenario, with a noticeable increase in exports from industries that Māori entities currently have significant interests in. For example, under this scenario export volumes from the horticulture industry in 2061 are 9.2 percent higher, and export meat volumes are 2.6 percent higher. As mentioned in the next section, this has a positive impact on employment in the primary, manufacturing and services industries.

The economic viability of small land holdings and small Māori entities has improved under this scenario through economies of scale and collaboration. To increase productivity and profits, small entities have had to increase their scale. This has improved the economic viability of small land holdings and small Māori entities, and resulted in increased productivity and improved employment opportunities.

Collaboration, and potentially the establishment of new indigenous business practises regarding collaboration and collective asset management, has also overcome some of the previous barriers to capital and investment. This has allowed these entities to improve their returns and the sustainability of their activities. It has also allowed these entities to access the science and innovation effort through improved capability and capacity.

Household consumption benefits from the lift in productivity. As shown in Table 3.1, consumption is 2.5 percent higher in 2061 under Scenario A compared to the baseline figures. This is primarily driven by a noticeable increase in the consumption (or purchase) by households of other services, which also positively impacts on employment in the services industries.

Table 3.1 Increased productivity scenario – difference from baseline

	2021	2031	2041	2051	2061
GDP (2010 $m)	661	3,353	8,282	19,591	49,590
GDP per capita (2010 $)	137	643	1,467	3,205	7,490
Consumption	226	1,111	2,768	6,716	17,312
Exports	387	1,949	4,701	10,701	26,061
Factor cost GDP	966	4,764	11,359	25,802	62,780
Māori GDP	238	1,132	2,563	5,431	12,135
Employment (000s)	7	30	56	92	148
Trade balance (%GDP)	0.03	0.14	0.25	0.37	0.54
Govt balance (%GDP)	0.07	0.26	0.43	0.64	0.96

Source: BERL calculations using CGE model and data from various sources

Success in productivity increases has yielded substantial benefits in 2061. The progression towards these substantial benefits is illustrated in Table 3.1. This scenario shows gains to the Māori and New Zealand economies through gains in national GDP, employment, and wider economic benefits.

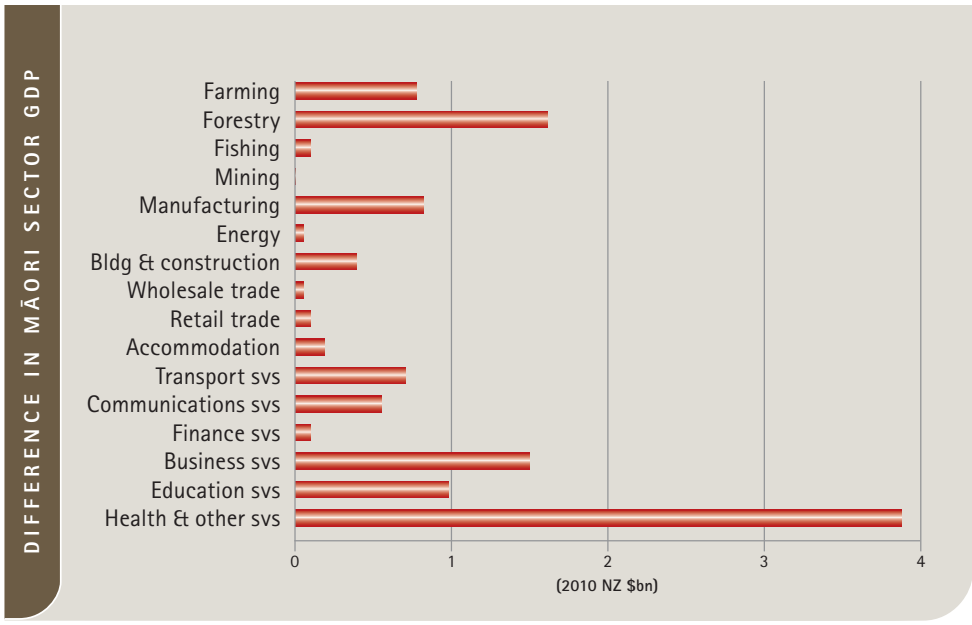
3.3.1 Employment opportunities under the increased productivity scenario

This scenario also results in significant additional employment growth. Employment in 2061 is 5.1 percent higher than the baseline figure. In 2061, employment in the baseline is 2,890,000, while in the improved productivity scenario employment totals 3,039,000. This is an increase of 148,000 people in employment.

Focusing on employment at an occupation level in 2061, under this scenario there is employment growth across a wide range of occupations. All skills are needed at all levels, but there are some subtle differences between this scenario and the next, which focuses on growth in export sales and volumes. Under this scenario, there is substantial gains made in the service-orientated industries while under the improved export effort scenario employment growth is across all of the sectors.

As illustrated in Figure 3.2, substantial growth is recorded in sectors such as the farming, forestry and manufacturing. This translates to an increase in the number of people employed in occupations such as forestry and related workers, machinery and trades workers, transport drivers, and professionals such as physical scientists and engineers towards 2061. For example, under this scenario there are employment opportunities for an additional 10,000 machinery operators compared to the baseline.

Figure 3.2 Increased productivity scenario - Gain in 2061 Māori GDP by sector



Source: BERL calculations using CGE model and data from various sources

There is also substantial growth in related sectors such as business services. This is due to an increase in economic activity in the primary sector creating a demand for services such as accountants, lawyers, and information technology (IT). Under this scenario, the number of people employed as professionals such as corporate managers and business professionals increases by over five percent per annum compared to the baseline.

Employment growth occurs in the education services sector, with a growing demand for education and training increasing the need for teachers and trainers at all levels of the education system. There is also the opportunity to increase the export of our education services.

Productivity improvements noted under this scenario also positively impact on employment in the health and other services sector. Compared to the baseline, employment opportunities for health professionals, nurses, and health associate professionals are over four percent higher under this scenario. Health professionals include occupations such as doctors, surgeons and dentists while health associate professionals include podiatrists, optometrists and audiologists.

People employed in occupations within the other services industries also benefit from higher average wages as a result of higher consumption of these goods and services. The other services industry includes people involved in repairs, maintenance and cleaning such as mechanics and drycleaners, as well as personal care services such as hairdressers and beauticians.

3.4 Improved export effort scenario

In the second scenario, there is a noticeable increase in export volumes and sales. This is due to innovation in the sales and marketing effort of the goods and services produced in the Māori economy.

- This results in GDP from the Māori economy being $12.3 billion higher than the baseline in 2061 and an additional 149,600 job opportunities.
- This is a 21.8 percent increase from the baseline figure of the 2061 GDP in the Māori economy – from $57 billion to $69 billion. This is a significant increase in GDP, and the largest increase in GDP in the Māori economy in the scenarios examined.
- This growth in GDP is also substantially higher than that occurring at a national level, where GDP in 2061 grows 2.7 percent.

In this scenario the world demand for export products from New Zealand expands beyond the baseline rates of growth across a range of industries such as agriculture – dairy and meat products; forestry – logs and wood products; fish – fish and aquaculture products; horticulture; tourism; education; and other services. New and modified products and services are successful developed and marketed domestically and internationally, along with a series of new 'brands'.

Under this scenario, export volumes are 3.5 percent higher in 2061 than in the baseline. While this increase in export volumes is not as high in total as under the increased productivity scenario, there are noticeably different impacts across the commodities. For example, fish exports in 2061 in the improved export scenario are 9.3 percent higher than the baseline. In contrast, the increased productivity scenario sees fish exports in 2061 at only 4.6 percent higher than the baseline. Similarly, other food and beverage exports are 23.3 percent higher in the improved export effort scenario, along with 7.7 percent more meat, 9.2 percent more horticulture, and 6.5 percent more log and wood product exports.

Due to the continued predominance of the Māori asset base in the primary sector, the growth in global demand for New Zealand exports is proportionally skewed in favour of the Māori economy, and is the result of innovation and a renewed focus by Māori businesses on overseas customers. Māori entities and enterprises have moved into and up the value-chain, using science and innovation to improve products and processes.

The increase in the value of goods and services produced in the Māori economy also leads to substantially higher investment across all industries. In percentage terms, real investment in 2061 is 5.8 percent higher under this scenario. For example, real investment in 2061 in the Māori fishing industry grows by an additional $118,000 in this scenario, while investment in the Māori forestry industry grows by an additional $517,000. This also leads to further investment in other sectors of the Māori economy such as business and education services.

Table 3.2 Improved export effort scenario – Difference from baseline

	2021	2031	2041	2051	2061
GDP (2010 $m)	379	2,148	5,532	13,069	31,738
GDP per capita (2010 $)	79	412	980	2,138	4,794
Consumption	227	1,139	2,824	6,670	16,455
Exports	180	1,061	2,626	5,692	12,342
Factor cost GDP	827	4,239	10,161	22,556	52,116
Māori GDP	246	1,182	2,681	5,632	12,344
Employment (000s)	7	32	59	96	150
Trade balance (%GDP)	-0.03	-0.06	-0.09	-0.15	-0.28
Govt balance (%GDP)	0.06	0.23	0.38	0.56	0.79

Source: BERL calculations using CGE model and data from various sources

Under this scenario, science policy levers have been aligned to the needs of the Māori economy, and engagement and closer alignment between the science and innovation effort and the Māori economy has occurred. Moreover, human capital has also grown and the population has the appropriate skills, training and education to seize the employment opportunities that have arisen. Māori entities and enterprises therefore have the capacity and capability to engage in a truly two-way relationship with players central to the science and innovation effort.

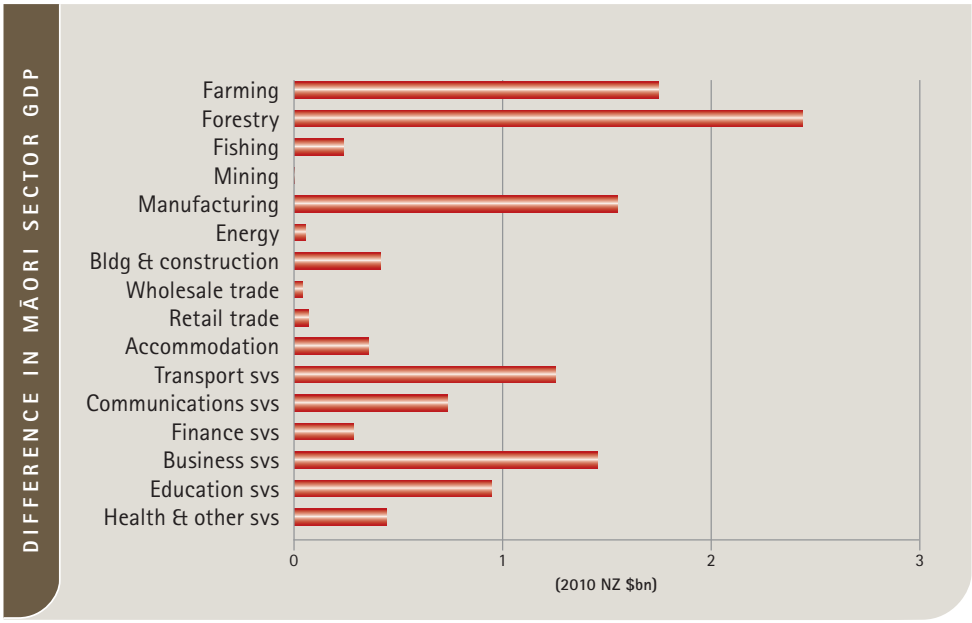
This two-way relationship and collaboration between the Māori economy and the science and innovation effort has also spurred additional opportunities outside of the current enterprises in the Māori economy. This will add even more to the potential income that undoubtedly resides in the Māori economy – as well as the wider New Zealand economy – and encompasses new and emerging industries and areas of employment.

3.4.1 Employment under the improved export effort

In 2061, employment under the improved export effort scenario is 5.2 percent higher than the baseline figure. This means there is an additional 150,000 people in employment under this scenario compared to the baseline. This employment growth is slightly higher than that recorded in the increased productivity scenario, where employment in 2061 is 5.1 percent higher than in the baseline.

Figure 3.3 Improved export effort scenario - Gain in 2061 Māori GDP by sectorFigure 3.3 below illustrates the distribution of this employment based on gains in GDP by sector. Those sectors that have the greatest gains in GDP compared to the baseline are also those that are generating significant outputs. These outputs require labour, which can be interpreted as employment growth and the creation of new jobs.

Figure 3.3 Improved export effort scenario - Gain in 2061 Māori GDP by sector



Source: BERL calculations using CGE model and data from various sources

Looking at employment growth by industry, and focusing on the 16 industries we have identified within the Māori economy, employment growth under the 'shock' in 2061 is strong in the primary industries of Māori forestry, fishing, and farming. There is also substantial growth in employment in manufacturing and transport. However, the spread of employment opportunities is more evenly distributed under this scenario than under the productivity scenario.

Focusing on employment at an occupation level in 2061, under this scenario there is employment growth across a wider range of occupations. There is strong growth in occupations such as labourers and machine operators, but equally the number of people employed as corporate managers and finance, sales and administration workers also grows substantially under this scenario compared to the baseline. For example, an additional 14,000 people are employed as labourers under this scenario compared to the baseline and an additional 4,000 health professionals and nurses are employed under this scenario compared to the baseline.

Unsurprisingly, employment growth in the farming, forestry, fishing and manufacturing sectors is stronger under this scenario compared to the baseline. For example, an additional 13,000 farmers and growers are required under this scenario compared to the baseline.

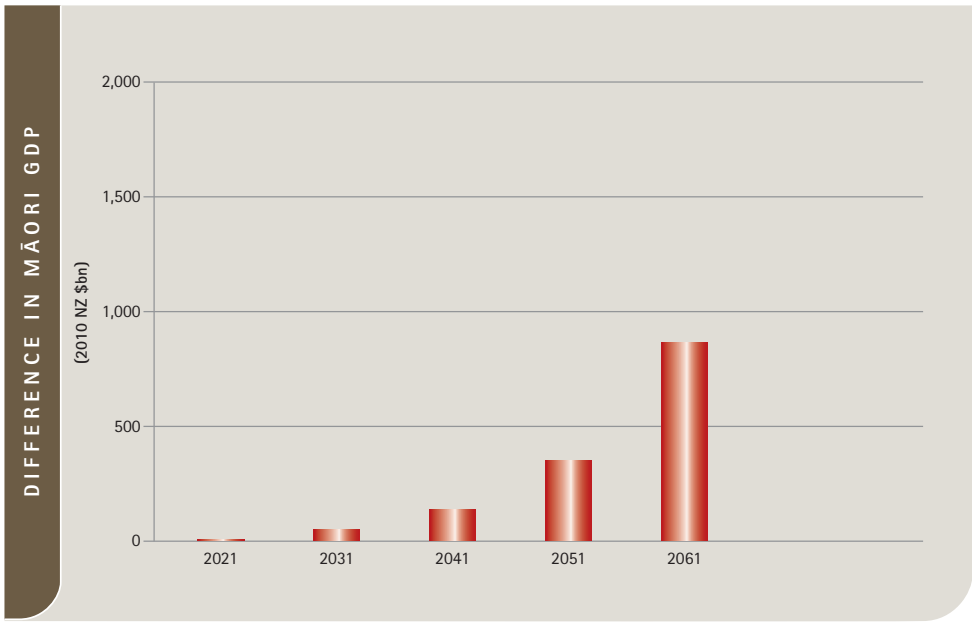
Service industries – education, business services, and health and other social services – benefit from the flow-on effects of employment growth in the other export-focused sectors. Scientific research and computer services, and other business services also benefits from a lift in the world demand for exports from New Zealand.

Under this scenario, opportunities have been seized and gains made to the Māori and New Zealand economies through increases in GDP and employment, and wider economic benefits. Connectivity and collaboration has occurred and the science sector is now working as a system whereby Māori entities and enterprises, as well as other businesses, move through the system.

3.5 Investment focus scenario

In the third scenario more science and research investment is directed into the Māori economy, but this investment is not accompanied by increased productivity or the commercialisation of new products, services or markets.

Figure 3.4 Investment focus scenario – Māori GDP difference from baseline



Source: BERL calculations using CGE model and data from various sources

- Under this scenario GDP from the Māori economy is $868 million higher than the baseline in 2061, and an additional 31,000 job opportunities are created.
- This represents a 1.5 percent gain from the baseline figure of GDP in the Māori economy in 2061 of $57 billion. This is a relatively small increase in GDP and, further, is only slightly higher than the increase in national GDP of 1.3 percent.
- The household consumption spending component of GDP grows by less than one percent under this scenario and investment is slightly less than two percent.

Under this scenario, more science and innovation investment and effort is directed into the Māori economy. However, this investment is not as successful in lifting productivity. Nor is there recorded success in developing new markets or new products. This scenario can be viewed as one where investment spending is the focus, but there is a failure to apply or commercialise such efforts either by lift the productivity of existing assets or by engaging in new ventures.

Some capital is accumulated under this scenario in the Māori economy, which is positive, but the productivity and profitability of existing assets remains at their baseline levels. Consequently, the gain to GDP over the period to 2061 is minimal.

Under this scenario, export volumes are 2.3 percent higher in 2061 than in the baseline. This growth is an improvement on the business as usual situation, but these volumes are noticeably lower than the modelled outcomes under the previous two scenarios.

For example, the export of fish under the improved export effort scenario was 9.3 percent higher in 2061 compared to the baseline, and 4.6 percent higher in the increased productivity scenario. However, in the investment focus scenario fish exports in 2061 are only lifted by 2.5 percent above the baseline.

Export volumes of other food and beverage products in 2061 are 23.3 percent higher under the improved export effort scenario, along with 7.7 percent more meat export volumes and 9.2 percent more horticulture, and 6.5 percent more log and wood product exports. In comparison, this investment focus scenario sees export volumes of other food and beverage products in 2061 up only 3.3 percent, with 0.8 percent more meat, and 2.2 percent more horticulture export volumes.

The prices received for these exported goods are also lower under this scenario. For example, the prices received for logs under this scenario are three times lower than that received under the increased productivity scenario.

By sector, the difference in GDP generated by this scenario (compared to the baseline) is very small. Across the sectors, the difference between the gross outputs of the primary, manufacturing and services sector under this scenario is less than two percent.

3.5.1 Employment under the investment focus scenario

Under this scenario, the unemployment rate drops, but not as noticeably as under the two scenarios examined earlier. Consequently, employment growth is substantially lower in this investment focus scenario. Employment is just over one percent higher than the baseline in 2061, while this difference is more than five percent in each of the increased productivity and improved export effort scenarios.

Lower export volumes under this scenario compared to the baseline translates to small employment changes in the primary and manufacturing sectors in 2061. Under this scenario, the number of people employed in the manufacturing of primary products is lower than the baseline. This is also reflected in employment in the Māori economy where employment in farming, forestry, fishing, mining and manufacturing is all lower under this scenario than the baseline.

These small employment changes and lower levels of employment in the primary sector in turn negatively impacts on the demand for transport and business services. Employment in retail and wholesale trade is largely unaffected by the continued investment in science and innovation, but education services and health and other services do not benefit from an increase in consumption, real wages or investment in skills, education and training.

Table 3.4 Investment focus scenario – Difference from baseline

	2021	2031	2041	2051	2061
GDP (2010 $m)	186	996	2,555	6,179	15,701
GDP per capita (2010 $)	39	191	453	1,011	2,372
Consumption	43	236	641	1,667	4,517
Exports	109	578	1,453	3,387	8,253
Factor cost GDP	167	893	2,290	5,547	14,163
Māori GDP	11	60	151	356	868
Employment (000s)	1	5	11	19	31
Trade balance (%GDP)	0.02	0.07	0.13	0.18	0.25
Govt balance (%GDP)	0.01	0.05	0.09	0.15	0.24

Source: BERL calculations using CGE model and data from various sources

While all of the scenarios examined indicate the importance of aligning science policy levers to the needs of the Māori economy now and towards 2061, this scenario in particular highlights the importance of not just investing money into science, and innovation but the need to invest in commercialising and developing this potential. Putting resources into this effort will only do

so much, as indicated by the relatively small gains under this scenario. It is critical that the next step of application and/or the commercialisation of such effort is undertaken.

As mentioned earlier, Māori entities and enterprises have a set of characteristics that means solely linking innovation to the Māori economy to lift productivity is to pursue too narrow a perspective. The combination of assets held over a range of governance and management structures, with varying degrees of scale, capacity and capabilities, suggests a multi-dimensional perspective needs to be undertaken.

Here, a one size fits all approach has been undertaken and while some additional capital is accumulated, productivity levels and the customer focus of businesses remains as in the baseline. Under this scenario the emphasis remains on innovation and investment in the science and innovation effort, but this investment is not being accessed by players in the Māori economy, nor is it meeting their changing and differing needs.

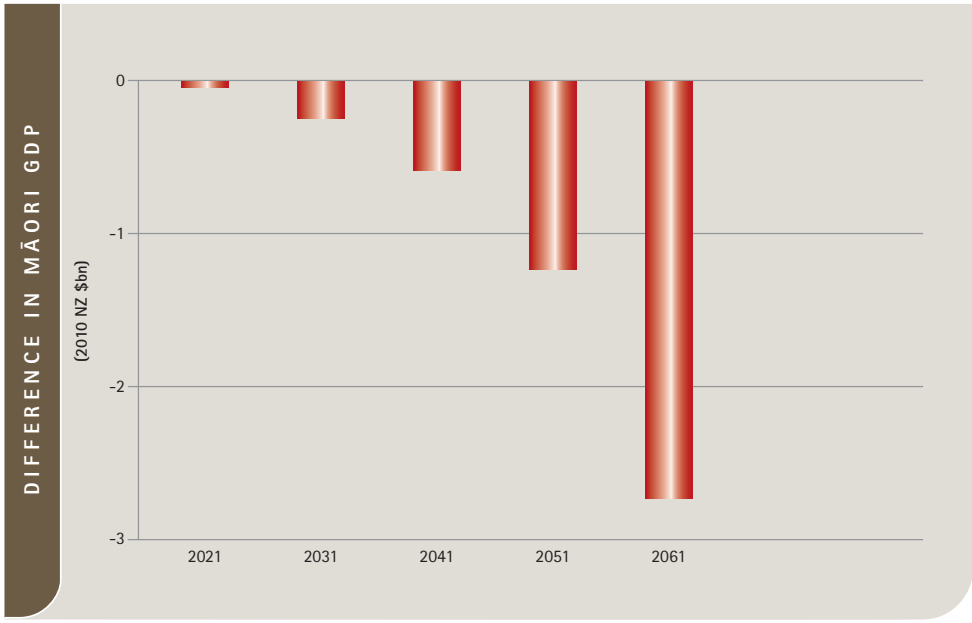
3.6 Doing nothing scenario

In the last scenario, a do nothing approach sees the "running down" or devaluing of the Māori asset base. Note, this scenario differs from the business as usual scenario.

This devaluation is due to a lack of maintenance in the absence of sufficient investment funds arising from existing assets. This arises from the low profitability of existing assets due to their currently below-average levels of productivity. Consequently, the Māori asset base over time progressively degrades.

- This results in GDP from the Māori economy being $2.7 billion lower than the baseline in 2061 and 35,200 fewer job opportunities.
- Under this scenario, the GDP from the Māori economy in 2061 is $2.7 billion below the baseline. This is a 4.8 percent decrease from the baseline figure of Māori GDP in 2061 of $57 billion, to $54 billion in 2061 under the doing nothing scenario.
- This decline in GDP also impacts on outcomes at the national level, where GDP in 2061 is 1.0 percent (or $12 billion, measured in 2010 values) below the baseline.

Figure 3.5 The do nothing scenario – Māori GDP difference from baseline



Source: BERL calculations using CGE model and data from various sources

Household consumption and exports suffer in this scenario. As shown in Table 3.5, consumption in 2061 is 0.6 percent lo wer than the baseline in the doing nothing scenario. This decline in household consumption is primarily driven by a noticeable increase in the unemployment rate (to 7.8 percent compared to 6.7 percent in the baseline).

Exports are 1.7 percent lower in 2061 in the doing nothing scenario compared to the baseline figures. Across all of the sectors export volumes are below the baseline figures. However, there are noticeably lower export volumes from key industries relevant to the Māori economy such as logs and wood products, horticulture, other food and beverages, and tourism.

Table 3.5 The do nothing scenario – Difference from baseline

	2021	2031	2041	2051	2061
GDP (2010 $m)	-143	-765	-1,947	-4,691	-12,015
GDP per capita (2010 $)	-30	-147	-345	-767	-1,815
Consumption	-54	-272	-687	-1,678	-4,333
Exports	-79	-427	-1,070	-2,494	-6,182
Factor cost GDP	-216	-1,094	-2,643	-6,045	-14,749
Māori GDP	-56	-265	-595	-1,247	-2,741
Employment (000s)	-2	-7	-13	-22	-35
Trade balance (%GDP)	0.00	-0.03	-0.05	-0.09	-0.13
Govt balance (%GDP)	-0.02	-0.06	-0.10	-0.16	-0.24

Source: BERL calculations using CGE model and data from various sources

Under this scenario, some of the issues facing Māori entities and agribusinesses involved in the primary industry in 2010, such as sustainable land use and implementing best practice, have not been addressed. Capability and leadership issues remain and these have created a barrier to Māori enterprises contributing directly and indirectly with the innovation effort, and engaging with additional opportunities outside of the current enterprises in the Māori economy.

The asset base has devalued as assets have been run down, leading to a decline in productivity and profit, and less investment by Māori enterprises in areas such as machinery and equipment, improvements, capital funds, and human capital.

Under this scenario, the Māori economy has not grown through the parallel investment in people – their skills, knowledge, training and experience. Without this parallel investment in building the skills and education base, employment needs have not been met and the sustainable development of the asset base has not met intergenerational aspirations.

3.6.1 Employment under the doing nothing scenario

Doing nothing results in lower employment. Employment in 2061 is 1.2 percent (or 35,000) lower than in the baseline scenario. In 2061, employment in the baseline is 2.89 million while doing nothing results in employment of 2.86 million.

Focusing at an occupation level in 2061, in the doing nothing scenario employment is lower than baseline across a wide range of occupations. However, there are substantially more losses in occupations such as forestry and related workers, machinery and trades workers, and transport drivers. There are also noticeable losses in the professional categories such as physical scientists and engineers. Employment losses under a do nothing scenario are in stark contrast to the employment growth seen in the improved productivity and improved export effort scenarios, where employment levels were more than five percent above baseline.

4. Putting it together

4.1 The foundation

Science, innovation and trade is a key area for New Zealand's future well being. This area, and its associated investment, currently focuses on targeted science investigations and wider research and development activities. Decision-making, planning and the formulation of policy regarding this investment and its associated activities requires robust data and strategic information.

It is clear that investment in science and innovation is necessary for Māori human capital development, participation in advanced technologies, and productivity improvements in the Māori economy. However, concern has been raised that there is a disconnection between science and innovation and the Māori economy. The transfer of innovative and scientific knowledge from the knowledge producers to Māori enterprises is weak, and new focus is required to achieve an explicit relationship that meets the particular needs of the Māori economy. A fuller discussion of these issues is captured in our report entitled, Māori, Science and Innovation – Themes and Industry Issues to Inform Scenarios.

Identifying the challenges in this area enabled us to propose and model scenarios of the Māori economy in 2061. These scenarios quantified the success (or not) of achieving an improvement in the relationship, engagement and alignment between the science and innovation effort and the Māori economy. The modelling of the scenarios provided estimates of the benefits of a quantum change in the performance of, and returns to, assets residing in the Māori economy. The modelling also provided estimates of the quantifiable costs of a 'do nothing' scenario based on the current 'business as usual' framework.

The foundation for the scenarios was an update of the asset base of the Māori economy. Here, we gathered data and information on all entities and enterprises that self-identified as part of the Māori economy. We included collectively-owned assets, assets arising from Treaty of Waitangi settlements, Māori entrepreneurs active in individually-owned businesses and/or small to medium enterprises (SMEs), as well as the contribution of Māori employees in terms of wages earned. This report, entitled The Asset Base, Income, Expenditure and GDP of the 2010 Māori Economy, details our findings on the asset base of the Māori economy and its industry composition.

Overall, the modelled outcomes provide compelling evidence of the potential, opportunities and value of aligning the science and innovation effort with the requirements of the Māori economy. They also provide compelling evidence that investment and effort in science and innovation can provide growth opportunities for the Māori and the New Zealand economies.

4.2 The policy lens

This project has explored the relationship between New Zealand's science and innovation effort and the Māori economy. Through economic modelling it found that the difference between unlocking the potential in the Māori economy and doing nothing is 185,000 job opportunities in 2061. For the public sector, this project illustrates the importance of the Māori economy and Māori economic development to the national economy.

The scenarios also highlight the 'step change' difference between science and innovation policy that is concentrated solely on funding the science sector, as opposed to an effort that focuses on overcoming the communication, capability, and commercialisation challenges faced by potential scientists, innovators and Māori entrepreneurs.

The role of the public sector is, arguably, one of facilitation – to connect people with research, knowledge and technology, capability, and investment capital. Policy can improve the understanding of the role science and innovation can play in economic development. Other government levers should also be used to create opportunities for key networks and contacts to become known to both parties.

4.3 The Māori scene

This project found that while the asset base of the Māori economy in 2010 is substantial and growing, it is underperforming.

There are large areas of Māori land that are considered marginal, unproductive and/or underperforming. There are also tracts of land that do not have administration and are therefore lying idle. These land blocks, and the legislation that governs them, needs to be brought into production. The first scenario illustrated the substantial benefits that could occur through increasing productivity.

In many instances the need for changes to governance and/or management structures is evident. Difficulties in making decisions due to inability to communicate with the many stakeholders in a Māori entity may cause some to default to a 'do nothing' decision. However, the opportunity costs of doing nothing and seeing the asset run down or devalue, as illustrated in the fourth scenario, are too high for this land to continue to underperform.

Legislation changes need to occur and quantitative evidence as provided by this project reinforces this need.

Enhancements in governance, management, communications and capabilities can also arise through collaboration with exemplar enterprises in the Māori economy. Such collaboration may also open opportunities to enjoy benefits from scale. However, maintaining the independent identity of owners and beneficiaries of particular assets means such collaboration is likely to require skilful management. Leadership was a characteristic trait suggested as necessary to ensure successful collaboration in this context.

Productivity improvements could also occur at a variety of levels in many agriculture, horticulture and forestry operations. For example, land-based improvements such as fencing or pasture renewal; the harvesting or re-planting of forestry; and improving water quality issues and nitrogen leaching. Many Māori agribusinesses are aware of the need to make improvements in their production processes, they now need to access the capital and science and innovation to do the same things better or to do new things.

Improving productivity will generate income and provide much needed funds for investment. These funds could then be re-invested in physical improvements such as equipment and machinery, or human capital such as skills training, scholarships or the employment of additional staff.

Another result from these gains lies in the ability to build further capability. Having the appropriate skills, education and training ensures that when opportunities arise, people are able to take advantage of them. Moreover, a highly skilled workforce is more resilient to change and has the ability to successful transition between jobs and careers as the labour market and employment conditions change. Understanding the value of science and innovation will improve opportunities for a variety of stakeholders in the Māori economy.

Māori employers face the same issues as non-Māori operators. They are concerned about gaining access to credit and business lending, and science and innovation funding. They also want to employ skilled staff with the right qualifications and experience.

Similarly, Māori self-employed entrepreneurs also require access to credit to establish and run their business, and access to skilled, qualified staff. They may also require access to science and innovation, and while this may be at a different level to Māori employers they still require access to the learnings from research to improve their processes and adopt new working practises and procedures, and keep up to date. For those Māori who are considering self-employment they also require access to appropriate education and training, and careers advice to decide what field to enter to ensure there will be an appropriate level of labour market demand after they finish their training to get employment.

4.4 The science scene

The Māori economy is not only large, it has many dimensions. The science sector needs to work in this space, but cannot adopt a one size fits all approach to engaging with the Māori economy. There are many facets to the Māori economy including collectively-owned assets and Māori SMEs. Also, within collectively-owned assets there are issues as Māori land trusts operate differently from Māori land incorporations, which are different again from MIOs and the asset holding companies of PSGEs. Each of these entities has a different focus, is at a different stage of development, and has different management and governance structures in place.

Thus the focus needs to be on improving communication and building long-term relationships. The active engagement of the science sector with Māori entities and enterprises is required. The aim would be to improve the capability and capacity of both science sector organisations and Māori entities and enterprises to allow them to work as partners in our wider science and innovation efforts.

It is important to recognise the difference between increased funding for the science sector and improved funding coupled with genuine engagement with entrepreneurs for successful collaboration. The opportunity costs of not engaging and not aligning the needs of the Māori economy with investment in science and innovation are high. Improved funding with little engagement provides only marginal returns.

Overall, the greatest value is added to the New Zealand economy through commercialising science and innovation, and improving productivity. This results in gains to the New Zealand and Māori economies in terms of GDP and employment, and gains in economic development through growth in economic activity, well-being, and human capital development.

The greatest return on investment is therefore through active engagement and alignment rather than taking an approach solely focussed on funding streams. This research has quantified the potential that exists in the asset base of the Māori economy if the national science and innovation effort was aligned to meet its needs. Active engagement is required now to unlock this potential.

4.5 Labour skills, education and training are also central

The scenarios suggest that the availability of labour is not a constraint. However, the realisation of the potential opportunities requires an appropriate composition of skills to be available in the labour force over the next fifty years. That is, the demographics, along with an assumed average net inflow of migrants, can supply the necessary quantity of labour required. But, ensuring the suitability of the future labour force in terms of skills, experience and productivity requires prior investment in education and training.

Again, the focus must go beyond the funding of education. There is a need for the education and training effort to build a closer relationship between the requirements of industry, enterprises and asset owners, both Māori and non-Māori.

People need access to the education and training they require to deliver them with the appropriate skills and knowledge to find employment matching the skills required by industry and entrepreneurs to realise the potential opportunities. The scenario findings indicate this investment and engagement needs to be undertaken over the long-term. The ongoing supply of a growing skilled workforce is an implicit assumption that underlies the two (increased productivity and improved export effort) scenarios, without which the potential opportunities will not be released.

The long-term context means investment and training effort should occur across the whole spectrum of skills, from foundation skills through to specialist higher skills. Foundation skills allow entry to tertiary/vocational education level at any stage in their life. Encouragement to school leavers to leave school with qualifications, and successfully transition into other areas of learning or work would form part of such a longer-term focus. Enabling the successful transitions at various points in career pathways such as redundancy, sickness, career change or care of a family member also forms part of a vibrant labour market underpinning the realisation of the potential opportunities modelled.

4.6 What next?

This report should not be seen as an endpoint; rather it is part of a continuum that focuses discussions on science, innovation and the Māori economy. There are many push and pull factors at work within the science sector and the Māori economy. To move away from working in compartments and towards a system that ensures connectivity and collaboration requires extending our thoughts beyond what has been comfortable in the past.

Realising the potential that exists in the Māori economy requires a long-time horizon. But that does not mean that a 'doing nothing' approach should be adopted until that future date arrives. There is a need for a step change now to lift the Māori and New Zealand economies of the future. This will add value to the New Zealand economy – our productivity, employment opportunities and incomes.

Current efforts have not delivered the investment in science and innovation necessary to enable the transformation of the Māori economy. Science and innovation investment needs to increase and be better aligned to the needs of the Māori economy. This growth needs to be driven by a closer engagement between policy makers, funding decisions, long-term relationships, Māori enterprises, Māori asset owners and beneficiaries.

5. Concluding comments

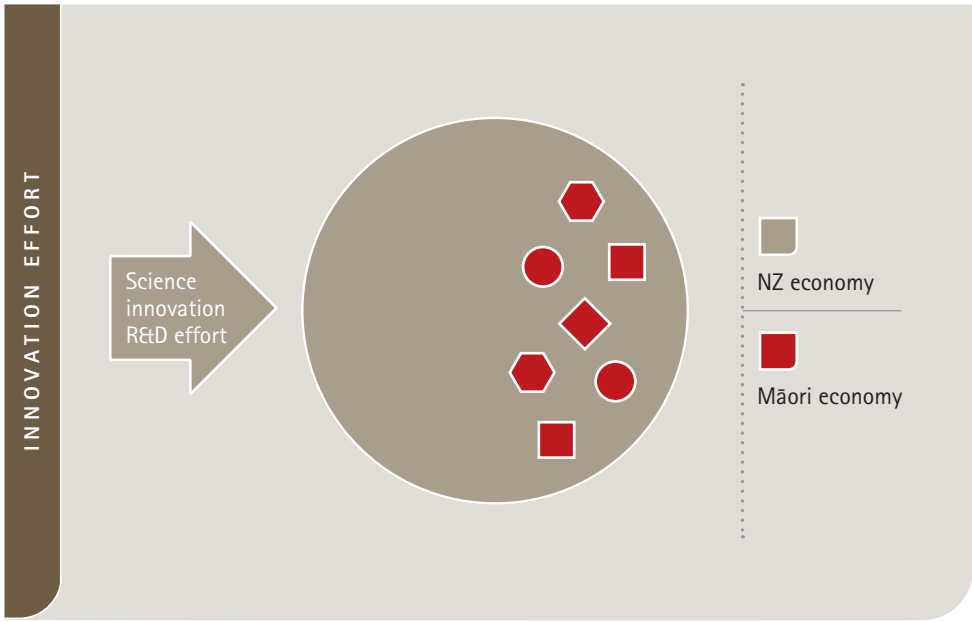
5.1 A story

That science and innovation spending closely targeted to the needs of business and industry, with consequent successful commercialisation gains, yields significant economic gains is not surprising.

However, this project extends the model finding to emphasise the importance of genuine engagement when addressing the unique characteristics of enterprises in the Māori economy.

As a starting point, we could simplistically depict the relationship between science and innovation and the income generated by New Zealand economy as in Figure 5.1. Components of income arise from activities 'associated with' Māori assets (whether collectively or individually owned, including physical as well as human capital resources). Further, the innovation effort is broadly directed towards the New Zealand economy, aimed at improving the income generated from economic enterprises.

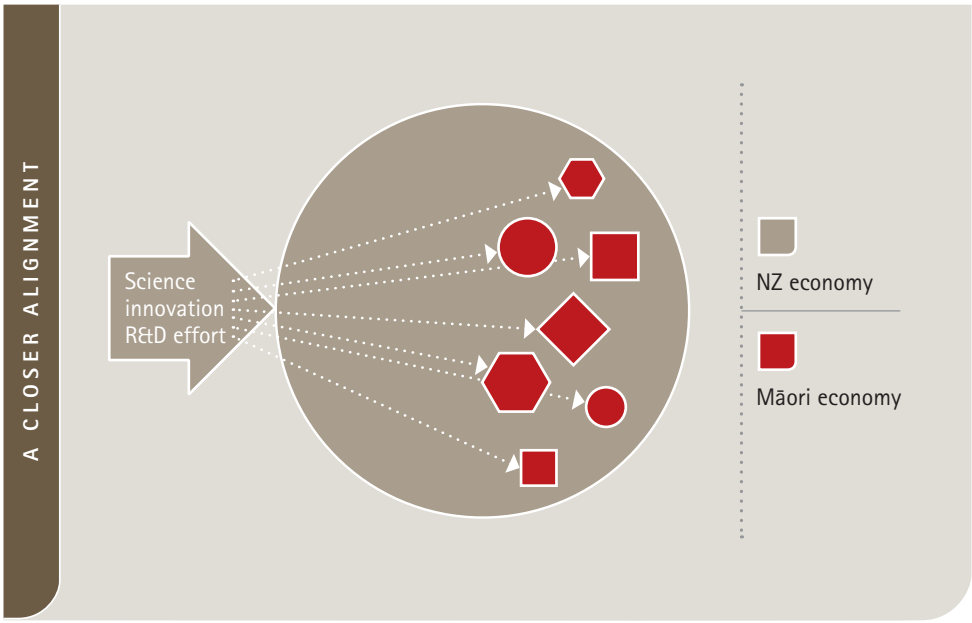
Figure 5.1 Schematic of innovation effort and the NZ economy



A few steps forward from this depiction would lead to that pictured in Figure 5.2, whereby the innovation effort is encompassed within (as opposed to being external to) NZ's economic effort and the income generated by its enterprises. Further, the innovation effort also develops a specifically close alignment with the needs of Māori enterprises. This acts as a catalyst for an increase in the size of the Māori economy. But, not only does the income from Māori enterprises grow, so too does the income emanating from the wider NZ economy.

However, this depiction remains a narrow perspective on the potential and opportunities that could arise were there an improved alignment between the innovation effort and the Māori economic enterprises. This narrow depiction is essentially a standard productivity improvement story, and is arguably applicable to almost all industries and sectors across the New Zealand economy. The need to improve the links between commercial enterprises and the science sector is not a new argument, and the story of consequential improved productivity and profitability is equally widely known.

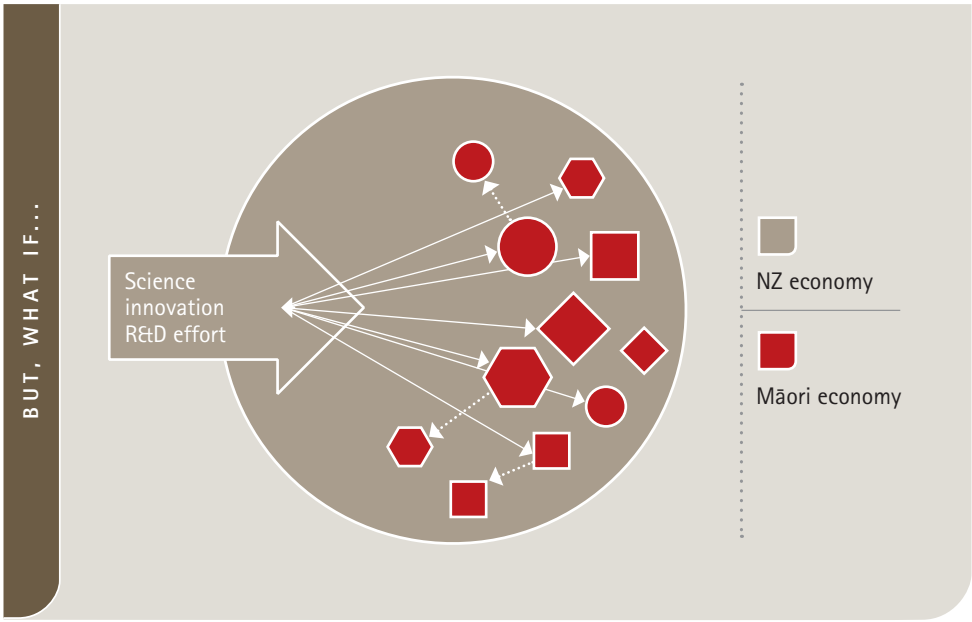
Figure 5.2 A closer alignment



Undoubtedly, though, the question of how to achieve such improved linkages remains elusive.

Our argument though, is that Māori enterprises are uniquely positioned (and have a set of characteristics) that means the story does not (and, indeed, must not) stop at Figure 5.2. The combination of assets held over a range of governance and management structures, with varying degrees of scale, capacity and capabilities, suggests potentially greater returns. Further, for these returns to be realises, the focus needs to go beyond the funding of science and innovation and extend to genuine engagement with Māori enterprises.

Figure 5.3 But, what if ...



This genuine engagement with the development of long-term relationships would help overcome issues with information, communication, capacity and capability of key players and stakeholders. Additional to a closer alignment would be the prospect of heightened collaboration between enterprises active in the Māori economy.

Such collaboration would potentially enable scale to be reached to ensure Māori enterprises had both the capacity and capability to engage in a truly two-way relationship with players central to the innovation effort.

As depicted in Figure 5.3, it is not just gains from scale that are targeted here, but also the ability for Māori enterprises to contribute directly and indirectly with the innovation effort; and also for such collaboration to spur additional opportunities outside of their current enterprises (or asset base).

Such a story adds even more to the potential income that undoubtedly resides in the Māori economy – as well as the wider New Zealand economy. It, no doubt, adds also to the challenges and issues faced.

5.2 Last words

Finally, we note:

- there would be a step change in the Māori economy were potential opportunities – from a closer alignment with New Zealand's science and innovation effort – realised
- to be realised, the opportunities require a long-term investment, effort and engagement with science and innovation
- that also critical to the realisation of these opportunities is long-term investment and effort in developing the skills and capabilities of labour force
- that increasing the performance of, and income and contribution from, Māori economy is critical to ensuring the economic asset base is not eroded in value. Such increased income is also critical to the development and kaitiakitanga of cultural, social, community and environmental assets and values of Māori and all other New Zealanders.

6. Glossary

Ahu whenua trusts	Established under Te Ture Whenua Māori Act 1993 (the Māori Land Act), the purpose of ahu whenua trusts is to promote the use and administration of the land in the interest of their owners. The trusts are managed by trustees, often a board, who manage the land on behalf of the owners. These land blocks have multiple owners, ranging from 20 to over 10,000, who are related by whakapapa. These owners have a cultural and shareholder interest in the land.
Asset base	Assets owned by Māori.
ANZSIC 1996	ANZSIC New Zealand version 1996 is the Statistics New Zealand Australian and New Zealand Standard Industrial Classification used in this project.
Beneficiaries	Those that benefit from a Māori land trust, including owners.
Capacity	The resources and time spent accessing research, data and information.
Capability	The ability to ask questions and interpret information, as well as apply for funding to assist with science and innovation investment.
Computer General Equilibrium (CGE) Model	A computable general equilibrium (CGE) model is a conventional tool of economic analysis that mimics the workings of an economy. It reflects the inter-relationships between producers and consumers, and their responses to changes in prices and costs. The model is a representation of the 'production' or 'real' side of an economy, where production includes the provision of goods and services sought by consumers. The BERL CGE model includes 75 industries, 40 types of labour and 25 types of exports. As part of this research the model has been enhanced to explicitly identify 16 industries that comprise the Māori economy and their links with the rest of the New Zealand economy. The CGE model is used to simulate the effect of a range of comparative scenarios. The scenarios are caused by different assumptions about the economic environment or influences such as productivity, government policy, world prices and/or world demand.
Current spending	Spending on consumer goods and services produced for immediate consumption by households.
Capital spending	The purchase of machinery, equipment, land and buildings that will generate further economic benefits (i.e. production or consumer goods) over future years. Capital spending (sometimes termed investment) by producer enterprises relates to their purchase of physical capital items (equipment etc.) which be used in production processes to generate consumer goods and services. Capital spending by households is limited to households' purchase of newly-built houses for owner-occupied residential purposes.
Economic development	Economic development is the increase in the standard of living in a nation's population with sustained growth from a simple, low-income economy to a modern, high-income economy. Also, if the local quality of life could be improved, economic development would be enhanced. Economic development includes the process and policies by which a nation improves the economic, political, and social well-being of its people.
Economies of scale	Economies of scale occur through the cost advantages a business obtains due to expansion. There are factors that cause a producer's average cost per unit to fall as the scale of output is increased. "Economies of scale" is a long run concept and refers to reductions in unit cost as the size of a facility and the usage levels of other inputs increase

Gross Domestic Product	The total market value of all final goods and services produced in a country (or an economy) in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports. GDP can be calculated from three different dimensions: the production account through the value added of individual industries or enterprises; the expenditure on final demand; and the income of sectors.
Human capital	Personal attributes that are productive in an economic context. Human capital often refers to formal educational attainment, with the implication that education is an investment where the returns are in the form of wage, salary, or other compensation. These are normally measured and conceived of as private returns to the individual but can also be social returns.
Innovation	The search for and development of new or improved production, management, sales or marketing processes that have the potential to add value to a firm's, an enterprise's, an industry's, or a sector's offering to end-users and/or consumers.
Labour force status	This classification is used by Statistics New Zealand to determine the employment, unemployment and unpaid activities of New Zealand's population. Labour Force Status includes people who are employed, unemployed, not in the labour force, and labour force status unidentifiable.
Māori economy	All Māori entities and enterprises that self-identify as Māori including entities that hold collectively-owned assets or those arising from Treaty of Waitangi settlements, Māori entrepreneurs active in individually-owned businesses and/or small to medium enterprises (SMEs), as well as the contribution of Māori employees in terms of wages earned.
Māori authority	Māori authorities include putea trusts, whanau trusts, whenua topu trusts, kai tiaki trusts, Māori incorporations and ahu whenua trusts established under Te Ture Whenua Māori Act 1993. They also include the Māori Trustee in the Māori Trustee capacity as an agent for an owner of land that is subject to Te Ture Whenua Māori Act 1993. Other Māori authorities include Māori Trust Boards, the Crown Forestry Rental Trust (CFRT), Te Ohu Kai Moana Trustee Limited (TOKM), Aotearoa Fisheries Limited AFL), Mandated Iwi Organisations (MIOs), and Post Settlement Governance Entities (PSGEs).
Māori enterprises	Māori enterprises are self identifying. This data was derived from Statistics New Zealand 2006 Census information. This explicitly identifies the ethnicity of individuals, their labour force status, and the industry they are employed in. This information is collated at the relevant ANZSIC division level. This 2006 data was updated to 2010 using information from the Household Labour Force Survey.
Māori entity	Data on Māori entities was derived from ahu whenua trusts, putea trusts, whānau trusts, whenua topu trusts, kai tiaki trusts, Māori incorporations, Māori Trust Boards, Rūnanga, PGSEs, MIOs and other collectively owned asset holding companies.
Māori incorporations	Māori incorporations have a structure similar to a company, but their purpose is to manage Māori freehold land on behalf of its owners. Māori incorporations were established under Te Ture Whenua Māori Act 1993 (the Māori Land Act). These incorporations can include one or more blocks of Māori freehold land if at least one of the blocks has more than two owners. To establish a Māori land incorporation, landowners apply to the Māori Land Court (MLC). Once a Māori land incorporation has been constituted, it can acquire any type of land.

Māori land	Māori land is defined by Te Ture Whenua Māori Act 1993. The definition in the Act is used by the Māori Land Court whenever it is required to determine the status of Māori Land.
Māori Economic Taskforce (MET)	On 28 January 2009, the Minister of Māori Affairs held an Economic Summit to canvass ideas and potential initiatives to ensure Māori could both mitigate the effects of the economic downturn and position themselves to reap the benefits of economic recovery. The Māori Economic Taskforce is the brainchild of this workshop and supports the introduction and implementation of initiatives to enhance Māori economic prosperity in the short-term and beyond the recession, as well as promote and utilise kaupapa Māori and Māori structures as drivers of prosperity. The Taskforce has a budget of $4.5 million per annum to research and implement initiatives.
Post-Settlement Governance Entity (PSGE)	A PSGE is the legal entity that a claimant group must ratify and establish before settlement of a historic Treaty of Waitangi claim with the Crown. The purpose of a PSGE is to hold and manage the settlement redress that is transferred to the claimant group under the Deed of Settlement (DOS).
Productivity	Productivity, in a broad sense, includes production-based improvements, innovative business models, enhanced sales and market offerings, the development of new products and services, and intellectual property.
Science	The advancement – through evidence gathering, observation and experimentation - of knowledge that has the potential to improve the well-being of individuals, communities and society.
Social Accounting Matrix (SAM)	A Social Accounting Matrix (SAM) summarises the many payments or transactions in an economy. These transactions or payments may involve a person, an industry, a household, an enterprise, the Government, a foreign customer or a supplier. The SAM summarises the source and destination of these transactions, i.e. who are making and who are receiving the payments. A matrix is another word for a table of numbers. In general, each column of the table represents payments by a person; and each row of the table represents payments received by that person. For example, take the case of a household paying income tax. This transaction will be represented by an appropriate figure in the intersection of the 'household' column and the 'government' row of the matrix. In a more formal sense, a SAM comprises a combination of an inter-industry transactions (or input-output) table and the accounting flows of income and outlays for particular institutional sectors of an economy.
Te Puni Kōkiri	Te Puni Kōkiri, the Ministry of Māori Development, is the Crown's principal adviser on Crown-Māori relationships. Te Puni Kōkiri means a group moving forward together.
Vision Mātauranga	Vision Mātauranga is a policy framework put in place by the Ministry of Research, Science and Technology. The purpose of Vision Mātauranga is to provide strategic direction for Vote RS&T funding for research of relevance to four themes, namely Economic, Environment Social and Knowledge.

7. References

Business and Economic Research Limited, (April 2011), The Asset Base, Income, Expenditure and GDP of the 2010 Māori Economy, Māori Economic Taskforce and Te Puni Kōkiri.

Business and Economic Research Limited, (April 2010). Māori, Science and Innovation – Potential, Opportunity and Value. A Scoping Report for the Māori Economic Taskforce.

Business and Economic Research Limited, (November 2010). Māori, Science and Innovation – Themes and Industry Issues to Inform Scenarios. Discussion document for the Māori Economic Taskforce.

Crown Research Institute Taskforce. (2010). How to Enhance the Value of New Zealand's Investment in Crown Research Institutes. Wellington, New Zealand: Ministry of Research, Science and Technology.

Foundation for Research Science and Technology. (2005). Māori Economic Innovation Strategy 2005-2012. Wellington, New Zealand: Foundation for Research, Science and Technology.

Ministry of Research Science and Technology. (2010, February 23). New RS & T Funding Priorities. Retrieved from http://www.morst.govt.nz/current-work/New-RST-funding-priorities

Ministry of Research, Science and Technology. (2005). Vision Matauranga. Wellington, New Zealand: Ministry of Research, Science and Technology.

New Zealand Institute of Economic Research. (2007). Māori Participation in the New Zealand Economy. Wellington, New Zealand: Te Puni Kōkiri.

Te Puni Kōkiri. (2007). The Māori Commercial Asset Base. Retrieved from http://www.tpk.govt.nz/en/in-print/our-publications/fact-sheets/Māoriassetbase/download/tpk-Māoriassetbase-2008-en.pdf

Kotahitanga Te Reo Wairuatanga
Kaitiakitanga Ukaipotanga Whakapapa
Pukengatanga
Rangatiratanga Manaakitanga
Whanaungatanga

Contact the Taskforce

Chair of the Māori Economic Taskforce: *The Hon Dr Pita R Sharples, Minister of Māori Affairs*

Taskforce Secretariat: *Carol Berghan*

Postal Address: *PO Box 18041, Parliament Building, Wellington 6160.*

Address: *Level 7, Bowen House, Wellington*

Contact: *Phone :* 04 817 9800 | *Fax :* 04 817 6525 | *Email :* met@tpk.govt.nz | *Web :* www.tpk.govt.nz