Creating a Participatory Guarantee System for organic certification in Cicia

A cost-benefit analysis

Prepared by Matthew Ho, Land Resources Division, Pacific Community

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Executive summary

The Development and Pilot Implementation of Integrated Pacific Island Organic/Ethical Trade Initiatives project is funded by the International Fund for Agricultural Development (IFAD) and implemented by the Pacific Community (SPC) for the Pacific Organic and Ethical Trade Community (POETCom), in order to help poor, rural smallholders and producers in Pacific Island countries and territories. The project is designed to enhance the ability of these producers to service higher-value local and export markets and gain access to higher incomes by obtaining organic certification for their products through the establishment of a Participatory Guarantee System (PGS). As part of this programme, support was provided for the establishment of a PGS in Cicia, an island in Fiji's Lau Province, to help its producers of virgin coconut oil (VCO) achieve an appropriate and recognised organic certification for their produce. This project took place over two years from December 2012 to December 2014. Following the conclusion of the implementation phase, SPC's Land Resources Division (LRD) conducted a cost-benefit analysis (CBA).

The project was designed to deliver environmental and social benefits, as well as indirect economic benefits, in addition to the direct economic benefits that are obtained from access to high-value local and export markets. These benefits include the banning of the use of potentially harmful chemicals on the island as part of the organic certification process, female empowerment due to the fact that VCO producers in Cicia are women, and greater access to markets for other agricultural products that result from the establishment of Cicia's 'brand' as an organic island.

The CBA takes into account the costs incurred in the establishment of the PGS in Cicia (the project costs), as well as the additional costs incurred by the Cicia VCO producers, which are a result of adopting new necessary processes for meeting certification standards that are demanded by higher-value markets. Despite the wide range of non-economic benefits of the project, as well as other indirect economic benefits, the CBA only quantifies the expected economic benefits of increased organic VCO revenues. The additional benefits and associated indirect additional costs are discussed in the report, but they are not quantified. However, these additional factors also need to be considered when contemplating the quantitative analysis results. A key question in this project is the treatment of the opportunity cost of labour of the producers. This will be discussed at length in this report and two scenarios have been constructed in order to explore the consequences of the inclusion or exclusion of this cost.

Since the project has only just completed its implementation phase – and the benefits are expected to flow over a longer period in the future – the costs included in the analysis are largely based on actual costs incurred (particularly the costs of the project to establish the PGS), while the benefits are largely based on projections of future VCO production and revenues, which rest on the assumption that project targets are met by 2016. There is no allowance in the analysis for project targets that may be missed or exceeded, which would change the analysis in a negative or positive manner, respectively. These are all limitations inherent in any attempt to analyse the costs and benefits of a project that has yet to complete its lifecycle.

Given the limitations discussed above, the CBA found that overall – under the assumptions of the central case – the project was found to have a net present value (NPV) of FJD 39,000 or FJD -86,000, depending on whether opportunity cost of labour is excluded or included, respectively. This translates into a benefit-cost ratio (BCR) of between 0.90 and 1.06. This suggests that for every dollar spent on this project, the return is between FJD 0.90 and FJD 1.06. An interpretation of these results – under the assumptions of the analysis – is that the additional social, environmental and indirect economic benefits of the project will have to be worth at least FJD 86,000 in order for the project to break even if the opportunity cost of labour is included. If this cost is excluded, non-financial benefits would add to the aforementioned FJD 39,000 in financial benefits.

Introduction

The Land Resources Division (LRD) of the Pacific Community (SPC) has conducted a cost-benefit analysis of the establishment of a Participatory Guarantee System (PGS) for the organic certification of virgin coconut oil (VCO) producers in Cicia – an island in the Lau Province of Fiji – following the conclusion of the project in December 2014.

Context

Development and Pilot Implementation of Integrated Pacific Island Organic/Ethical Trade Initiatives is a project that is funded by the International Fund for Agricultural Development (IFAD) and implemented by the Pacific Community for the Pacific Organic and Ethical Trade Community (POETCom). The overall goal of the project is to enhance smallholder Pacific farmers' access to high-value markets by obtaining the appropriate and recognised organic certification and support through the establishment of Participatory Guarantee Systems (PGS). This project took place over two years from December 2012 to December 2014.

Prior to the establishment of the project, coconut oil production in Cicia was mostly undertaken by households in order to meet their domestic needs for products derived from coconut oil. The production of coconut oil in Cicia is carried out by the women. Surplus amounts of oil produced – estimated to represent around 5 per cent of output – was shipped to Suva for sale in markets by relatives and friends of the islanders of Cicia. The VCO sold at markets in Suva returned around FJD 8 per litre. There was only one commercial producer of VCO, Selavo, which produced oil for export markets. Sales of VCO to export markets returned around FJD 13 per litre.

The VCO producers of Cicia may be better placed to gain access to more lucrative export markets upon the establishment of PGS for obtaining organic certification for their products.

Study objective

Given that the project only concluded in December 2014 (1 month prior to the completion of this study in January 2015), it is too early to assess the total impact of the project. However, this study is able to provide an evaluation of the benefits of the project to date as well as the expected future benefits, against the costs of the project. The study can also provide an estimate of the benefits that the project would need to achieve over its lifetime in order to offset its costs.

Specifically, this study is based on the following data:

- costs of the project's first year;
- estimate of the costs of the project's second year that are based on budgeted amounts; and
- estimates of VCO production volumes and revenues that are based on numbers reported for the first year of the project, data collected from Cicia and project targets.

This study includes the following aspects:

a. It analyses the costs and benefits of the project to establish a PGS for VCO production in Cicia.
b. It considers only the financial benefits of the project – increased income for VCO producers participating in the scheme in Cicia.
c. It considers the alternative uses of the time of participants in the project.
d. It makes an evaluation of the overall likely impact of the project.

Study approach

In preparation for undertaking the cost-benefit analysis, documents were provided by the project team that included progress reports, a risk analysis and value chain analysis (prepared for POETCom and SPC), as well as the original funding agreements that set out the purpose, objectives and budget of the project.

Additional information was also requested from the project team and the Cicia Islanders regarding the social, demographic, environmental and economic situation in Cicia.

Cost-benefit analysis methodology

Two scenarios were identified and analysed:

- a scenario where the project did not exist; and
- a scenario with the project as implemented.

The direct benefits of the scenarios were identified, analysed and quantified. The present value of the stream of benefits associated with each scenario was then compared with the present value of the stream of start-up and ongoing costs over a 20-year time horizon under an appropriate discount rate.

The results of the cost-benefit analysis are reported in terms of the following metrics:

- the net present value (NPV), the difference between the present value of total benefits and the present value of total costs; and
- the benefit-cost ratio (BCR), the ratio of the present value of total benefits to the present value of total costs.

A sensitivity analysis was then undertaken to test the robustness of the cost-benefit analysis results to changes in key assumptions and parameter values.

Background

Economy and population of Cicia

The adult population of Cicia is estimated to be around 1000. Roughly two-thirds of the population, or around 660 people, have attained education of no higher than the primary level. However, the younger generations tend to attain higher levels of education. Only around 8 per cent of the adult population, or around 80 people, have regular incomes or permanent jobs. They are mostly employed by government agencies, such as education, health and public works.

Private commercial activity is virtually non-existent, with the notable exception of Selavo – the only commercial coconut oil production operation on the island. Village stores that supply basic food items, fuel and simple household goods are managed by elected village cooperative committees. The cost of living is relatively high on Cicia, where the prices of goods sold at the village stores are estimated to be around 20 per cent higher than in Suva; this is largely due to shipping costs.

Coconut oil production in Cicia

Virgin coconut oil production in Cicia is carried out by women primarily for domestic consumption. Household oil requirements are estimated at 1.5 litres per week. Surplus coconut oil and other products such as mats and yams are sent to family networks in Suva for sale in order to raise cash to pay for school fees and basic household commodities. VCO sent to Suva for sale represent less than 5 per cent of all oil processed in the villages of Cicia. Prior to the PGS project, the supply of coconut oil from Cicia to Suva was irregular and limited, lacked commercial focus and there was little awareness of the marketing potential of the oil. Selavo was the only commercial VCO production operation on Cicia and utilised industrial machinery rather than traditional methods to supply export markets in Asia.

It takes the villagers in Cicia 25 coconuts and 1 hour to produce 1 litre of oil. This includes the time required to gather, husk, grate, squeeze, strain and bottle the oil. The cost of shipping oil by sea to Suva is estimated at around FJD 0.5 per litre. Air freight is not considered to be a viable option for bulk oil shipments.

Export markets and the PGS project

Coconut oil prices in the Suva markets fluctuate greatly and range from FJD 8 to FJD 18 per litre. However, according to a Cicia Development Advisory Committee member based in Suva who coordinates the sale of oil for some family members, the oil needs to retail for around FJD 8 per litre in order to sell substantial volumes in the Suva markets. Major buyers in export markets such as Korea, as well as the resorts of Nadi, are known to be willing to pay around FJD 13 per litre for organic VCO. Organic VCO from the Lau Group is known to retail for around NZD 25 per litre (or around FJD 38) in New Zealand, although the wholesale price of organically certified coconut oil from Sri Lanka is known to be at around NZD 9 per litre (around FJD 13). Given the ability of the women of Cicia to produce VCO and the lack of steady sources of income on the island, the export of VCO from Cicia represents a new source of potential income for the villagers.

However, in order to gain access to high-value VCO markets, Cicia would need to obtain organic certification for their products and would also need to meet quality standards demanded by major buyers such as resorts and wholesalers in export markets.

The Development and Pilot Implementation of Integrated Pacific Island Organic/Ethical Trade Initiatives project in Cicia aims to set up PGS in Cicia for providing organic certification to the VCO producers of the island. Organic certification would enable the Cicia producers to access the organic VCO market in countries that recognise PGS. It would also enable access to high-value markets for non-organic VCO as the quality standards that are required as part of the certification system would also reassure major wholesalers of non-organic VCO.

The project to set up organic VCO PGS in Cicia took place from December 2012 to December 2014 at the cost of USD 96,223 (approximately FJD 182,823) in the first year and budgeted expenditures of USD 66,667 (approximately FJD 126,667) in the second year.

Capacity of the Cicia producers

According to the Cicia Risk Analysis and Value Chain Analysis prepared for POETcom and SPC in July 2013, if an export market existed then projections on the oil production capacity of the 5 villages in Cicia would be uncertain. As coconut oil production fits into the daily routine of the women of Cicia, the time they could allocate to this activity varies. However, women interviewed in 4 of the 5 villages indicated that some could spend up to 3 hours a day, 3 days a week if a market existed for their product.

Given that it takes approximately 1 hour to produce 1 litre of VCO using traditional production processes on Cicia, the hypothetical maximum output of VCO would equate to about 3 litres of oil per day, per woman, or 9 litres per week, per woman. Given that approximately 255 households are involved in VCO production in Cicia, then the hypothetical maximum output capacity of the island would be 2295 litres per week, or around 9180 litres per month, which equates to around 612 buckets per month given that 1 bucket is equal to 15 litres.

To put this into perspective, coconut oil production by the villagers before the start of the project (excluding Selavo, the commercial producer) is estimated to be 403 litres per week (around 1612 litres or 107 buckets per month) with 95 per cent of that amount produced for domestic consumption and the remaining 5 per cent, around 20 litres per week (around 81 litres or just over 5 buckets per month), is shipped to Suva for sale.

In short, there is potential for coconut oil output to increase to nearly 6 times of pre-project levels. However, this does assume that all of the 255 households can allocate 9 hours per week to oil production activities and that such a large expansion in production would not face constraints in the supply of a key input – coconuts.

Scenario development

In order to evaluate the costs and benefits of the project, scenarios reflecting different outcomes from the implementation of the project were developed. This is necessary due to uncertainties over the treatment of the opportunity cost of the labour of the women who produce the coconut oil in Cicia. A baseline scenario reflecting an alternative state of the world where the project was not implemented also needed to be developed in order to serve as a baseline for comparison.

Two scenarios were developed for analysing the cost and benefits of the project in Cicia in addition to a baseline scenario:

- Scenario 1 – Input Costs: A scenario that only accounts for the monetary costs of producing VCO for the market in Cicia.
- Scenario 2 – Opportunity Costs: The cost of the labour of the women producing VCO in Cicia is added to the cost calculations in addition to the monetary costs.

The Fiji national minimum wage of FJD 2 per hour is used as the opportunity cost of labour of the women for profit production of VCO. This is used to measure the value of the women's time and the benefit they would receive from engaging in alternative activities.

Given the lack of alternative employment opportunities on Cicia, the lack of recreational activity options and that oil production activities in Cicia are a form of social activity amongst the villagers (as discovered by the project teams), there is some uncertainty as to whether the opportunity cost of labour should be considered.

Monetary costs of producing VCO for market include costs associated with packaging, shipping, quality control and other related costs. These costs would not be borne in production of oil for domestic household consumption only.

The scenarios are constructed for a 20-year period from January 2013 to January 2032; therefore, the base year of analysis is 2013. Both scenarios only capture the outcomes for the five villages in Cicia that are involved in the project. Selavo, the existing commercial oil producer, is excluded from the analysis.

As the lifetime of this project stretches over 10 years, the costs and benefits of the project need to be converted into an equivalent or comparable value, known as the net present value (NPV), using the discount rate. This is because costs and benefits that accrue earlier in the life of a project are given more weight than those that occur later.

The discount rate selected for evaluating this project is 10 per cent, based on the Asian Development Bank's practice of adopting a discount rate of 10–12 per cent for development projects (Zhuang et al. 2007). Projects in the Pacific are typically evaluated using a discount rate of 7–10 per cent (Buncle et al. 2013).

Baseline scenario

This scenario is necessary in order to produce an accurate baseline for measuring the impact of the project. Small quantities of oil would have been produced for sale in Suva markets, in the absence of the project, and need to be accounted for when assessing the generation of revenue for the people of Cicia from coconut oil production.

Given that under this scenario the project in Cicia would not have occurred and so there would have been no project expenditures, the output of Cicia's VCO producing villages would have remained at base-year levels. The villagers would continue to engage in oil production primarily for domestic household consumption and would continue to ship around 5 per cent of their output to Suva for sale in the markets.

The following table sets out the parameters of the baseline scenario.

TABLE 1. PARAMETERS – BASELINE

PARAMETER	UNIT	QUANTITY
COCONUTS PER LITRE OF REGULAR COCONUT OIL	Units	25
LABOUR PER LITRE	Hours	1
HOUSEHOLDS INVOLVED IN VCO PRODUCTION	Households	255
OIL USED PER HOUSEHOLD PER WEEK	litre (L)	1.5
COCONUT OIL OUTPUT	per cent	5
ESTIMATED WEEKLY OIL PRODUCTION PER HOUSEHOLD	litre (L)	1.6
ESTIMATED TOTAL OIL PRODUCTION	litre (L)	403
ESTIMATED OIL PRODUCED FOR SALE PER WEEK	litre (L)	20
ESTIMATED OIL PRODUCED FOR SALE PER MONTH	litre (L)	81
PRICE OF COCONUT OIL SOLD	FJD/L	8
MARKET VCO PRODUCTION COSTS	FJD/L	5
CAPACITY OF BUCKET	L	15
DISCOUNT RATE	per cent	10

The data used to derive the parameters of the baseline scenario are drawn from data collected by the project team prior to implementation of the project. Opportunity cost of labour is excluded from the baseline scenario as it is assumed that all oil shipped to Suva for sale is surplus and that additional time was not expended to produce this oil.

Project scenarios

The project scenarios are designed to represent the outcomes of the project. The first two years of these scenarios (2013–2014), which is the project implementation phase, are based on the actual outcomes. The remaining years are a projection of the evaluation period (2015–2032), based on project targets and progress to date.

Project implementation costs make up the majority of the costs of the project and are incurred upfront, in the first two years. However, the bulk of the benefits are expected to be realised in the future years. As a result, the bulk of the costs are based on actual numbers (project expenditures), while the benefits are mostly based on projected numbers with the assumption that project targets are achieved. However, it is also assumed that project targets will not be exceeded. As such, the results from the project scenario can be interpreted as a representation of a world where the project achieves its objectives, given the costs incurred and progress achieved to date.

The data used to construct the parameters for the project scenarios are based on progress reports from the project team up to 2014, project targets reported in project documents and other data collected by the project team. Given the rapid increase in reported output from the start of the project to 2014 (273 per cent), it is assumed that the remaining gap between 2014 output levels and project target output levels will be closed by 2016, with output increasing by 63 per cent over 2014–2015 and 38 per cent over 2015–2016.

The majority of the parameters of the two project scenarios are identical. The key points of divergence between the two scenarios are in the recurrent costs. Specifically, Scenario 1 excludes the opportunity cost of labour for the women producing the oil while Scenario 2 includes the opportunity cost, which is defined as the Fijian national minimum wage of FJD 2 per hour in the analysis.

The following table sets out the parameters of the project scenarios.

TABLE 2. PARAMETERS – PROJECT SCENARIOS

PARAMETER	UNIT	2013	2014	2015	2016-2032 (ANNUAL)
COCONUTS PER LITRE OF REGULAR COCONUT OIL	Units	25	25	25	25
LABOUR PER LITRE	Hours	1	1	1	1
FARMING HOUSEHOLDS	Households	255	255	255	255
OIL USED PER HOUSEHOLD PER WEEK	litre (L)	1.5	1.5	1.5	1.5
SHARE OF COCONUT OIL OUTPUT FOR MARKET	per cent	5	16	24	31
ESTIMATED WEEKLY OIL PRODUCTION PER HOUSEHOLD	litre (L)	1.6	1.8	2.0	2.2
ESTIMATED TOTAL MONTHLY OIL PRODUCTION	litre (L)	403	458	504	551
ESTIMATED OIL PRODUCED FOR SALE PER WEEK	litre (L)	20	75	122	169
ESTIMATED OIL PRODUCED FOR SALE PER MONTH	litre (L)	81	300	488	675
PRICE OF COCONUT OIL SOLD	FJD/L	13	13	13	13
MARKET VCO PRODUCTION COST	FJD/L	9	9	9	9
OPPORTUNITY COST OF LABOUR: FIJI MINIMUM WAGE (SCENARIO 2 ONLY)	FJD/h	2	2	2	2
CAPACITY OF BUCKET	L	15	15	15	15
DISCOUNT RATE	per cent	10	10	10	10

Measuring the costs and benefits

Baseline scenario

Costs

Under the baseline scenario, the following costs are incurred by the Cicia VCO producers.

- FJD 96,632 in production costs in total over 20 years – this includes shipping, packaging, and associated costs.
- This is FJD 45,247 in present value (PV) terms.

The costs are set out in detail in the following table. Note that the costs reported for each year do not sum up to the reported total as the numbers in Table 3 have been rounded to the nearest dollar.

TABLE 3. COSTS - BASELINE

YEAR	PRODUCTION COSTS (FJD)	TOTAL COSTS (FJD)	TOTAL COSTS - PV (FJD)
2013	4,832	4,832	4,832
2014	4,832	4,832	4,392
2015	4,832	4,832	3,993
2016	4,832	4,832	3,630
2017	4,832	4,832	3,300
2018	4,832	4,832	3,000
2019	4,832	4,832	2,727
2020	4,832	4,832	2,479
2021	4,832	4,832	2,254
2022	4,832	4,832	2,049
2023	4,832	4,832	1,863
2024	4,832	4,832	1,693
2025	4,832	4,832	1,539
2026	4,832	4,832	1,400
2027	4,832	4,832	1,272
2028	4,832	4,832	1,157
2029	4,832	4,832	1,051
2030	4,832	4,832	956
2031	4,832	4,832	869
2032	4,832	4,832	790
TOTAL	96,632	96,632	45,427

Benefits

Benefits received under the baseline are as follows:

- FJD 154,611 in revenues over 20 years.
- FJD 72,396 in PV terms.

The benefits are set out in detail in the following table. Note that the benefits reported for each year do not sum up to the reported total as the numbers in Table 4 have been rounded to the nearest dollar.

TABLE 4. BENEFITS - BASELINE

YEAR	SALES REVENUE (FJD)	TOTAL BENEFITS (FJD)	TOTAL BENEFITS - PV (FJD)
2013	7,731	7,731	7,731
2014	7,731	7,731	7,028
2015	7,731	7,731	6,389
2016	7,731	7,731	5,808
2017	7,731	7,731	5,280
2018	7,731	7,731	4,800
2019	7,731	7,731	4,364
2020	7,731	7,731	3,967
2021	7,731	7,731	3,606
2022	7,731	7,731	3,278
2023	7,731	7,731	2,980
2024	7,731	7,731	2,710
2025	7,731	7,731	2,463
2026	7,731	7,731	2,239
2027	7,731	7,731	2,036
2028	7,731	7,731	1,851
2029	7,731	7,731	1,682
2030	7,731	7,731	1,529
2031	7,731	7,731	1,390
2032	7,731	7,731	1,264
TOTAL	154,611	154,611	72,396

Project scenario 1 - No opportunity cost of labour

Costs

Under project scenario 1, the following costs are incurred by the Cicia VCO producers in addition to those in the baseline scenario.

- Additional production costs that total FJD 1.24 million over 20 years – this includes shipping, packaging and associated costs.
- FJD 1.43 million in additional costs over 20 years.
- This is FJD 0.70 million in PV terms.
- Opportunity cost of labour is not included in this scenario.
- The project implementation costs of FJD 0.19 million incurred over the two years over the period 2013–2014 are included in this scenario.

The costs are set out in detail in the following table. Note that the costs reported for each year do not sum up to the reported total as the numbers in Table 5 have been rounded to the nearest dollar.

TABLE 5. COSTS - PROJECT SCENARIO 1

YEAR	PROJECT IMPLEMENTATION COSTS (FJD)	PRODUCTION COSTS (FJD)	TOTAL COSTS (FJD)	TOTAL COSTS - PV (FJD)
2013	113,360	3,865	117,225	117,225
2014	78,540	27,568	106,109	96,462
2015	-	47,818	47,818	39,519
2016	-	68,068	68,068	51,141
2017	-	68,068	68,068	46,492
2018	-	68,068	68,068	42,265
2019	-	68,068	68,068	38,423
2020	-	68,068	68,068	34,930
2021	-	68,068	68,068	31,754
2022	-	68,068	68,068	28,868
2023	-	68,068	68,068	26,243
2024	-	68,068	68,068	23,858
2025	-	68,068	68,068	21,689
2026	-	68,068	68,068	19,717
2027	-	68,068	68,068	17,925
2028	-	68,068	68,068	16,295
2029	-	68,068	68,068	14,814
2030	-	68,068	68,068	13,467
2031	-	68,068	68,068	12,243
2032	-	68,068	68,068	11,130
TOTAL	191,900	1,236,415	1,428,315	704,458

Benefits

Benefits received under project scenario 1 in addition to those in the baseline scenario include:

- FJD 1.77 million in additional revenues over 20 years.
- FJD 0.74million in PV terms.

The benefits are set out in detail in the following table. Note that the benefits reported for each year do not sum up to the reported total as the numbers in Table 6 have been rounded to the nearest dollar.

TABLE 6. BENEFITS – PROJECT SCENARIO 1

YEAR	SALES REVENUE (FJD)	TOTAL BENEFITS (FJD)	TOTAL BENEFITS – PV (FJD)
2013	4,832	4,832	4,832
2014	39,069	39,069	35,518
2015	68,319	68,319	56,462
2016	97,569	97,569	73,305
2017	97,569	97,569	66,641
2018	97,569	97,569	60,583
2019	97,569	97,569	55,075
2020	97,569	97,569	50,069
2021	97,569	97,569	45,517
2022	97,569	97,569	41,379
2023	97,569	97,569	37,617
2024	97,569	97,569	34,198
2025	97,569	97,569	31,089
2026	97,569	97,569	28,262
2027	97,569	97,569	25,693
2028	97,569	97,569	23,357
2029	97,569	97,569	21,234
2030	97,569	97,569	19,304
2031	97,569	97,569	17,549
2032	97,569	97,569	15,953
TOTAL	1,770,902	1,770,902	743,637

Project scenario 2 – With opportunity cost of labour

Costs

Under project scenario 2, the following costs are incurred by the Cicia VCO producers in addition to those in the baseline scenario.

- FJD 1.24 million in additional production costs over 20 years – includes shipping, packaging and associated costs.
- FJD 0.30 million in opportunity cost of labour.
- Total additional costs total FJD 1.73 million, or FJD 0.83 million in PV terms.
- The project implementation costs of FJD 0.19 million incurred over the two years over the period 2013–2014 are included in this scenario.

The costs are set out in detail in the following table. Note that the costs reported for each year do not sum up to the reported total as the numbers in Table 7 have been rounded to the nearest dollar.

TABLE 7. COSTS - PROJECT SCENARIO 2

YEAR	PROJECT IMPLEMENTATION COSTS (FJD)	OPPORTUNITY COST OF LABOUR (FJD)	PRODUCTION COSTS (FJD)	TOTAL COSTS (FJD)	TOTAL COSTS - PV (FJD)
2013	113,360	1,933	3,865	**119,158**	**119,158**
2014	78,540	7,200	27,568	**113,309**	**103,008**
2015	-	11,700	47,818	**59,518**	**49,189**
2016	-	16,200	68,068	**84,268**	**63,312**
2017	-	16,200	68,068	**84,268**	**57,556**
2018	-	16,200	68,068	**84,268**	**52,324**
2019	-	16,200	68,068	**84,268**	**47,567**
2020	-	16,200	68,068	**84,268**	**43,243**
2021	-	16,200	68,068	**84,268**	**39,312**
2022	-	16,200	68,068	**84,268**	**35,738**
2023	-	16,200	68,068	**84,268**	**32,489**
2024	-	16,200	68,068	**84,268**	**29,536**
2025	-	16,200	68,068	**84,268**	**26,851**
2026	-	16,200	68,068	**84,268**	**24,410**
2027	-	16,200	68,068	**84,268**	**22,191**
2028	-	16,200	68,068	**84,268**	**20,173**
2029	-	16,200	68,068	**84,268**	**18,339**
2030	-	16,200	68,068	**84,268**	**16,672**
2031	-	16,200	68,068	**84,268**	**15,156**
2032	-	16,200	68,068	**84,268**	**13,779**
TOTAL	**191,900**	**296,233**	**1,236,415**	**1,724,548**	**830,002**

Benefits

Benefits received under project scenario 1 in addition to those in the baseline scenario include the following.

- FJD 1.77 million in additional revenues over 20 years.
- FJD 0.74 million in PV terms.

The benefits are set out in detail in the following table. The benefits are identical to those in project scenario 1. Note that the benefits reported for each year do not sum to the reported total as the numbers in Table 8 have been rounded to the nearest dollar.

TABLE 8. BENEFITS – PROJECT SCENARIO 2

YEAR	SALES REVENUE (FJD)	TOTAL BENEFITS (FJD)	TOTAL BENEFITS – PV (FJD)
2013	4,832	4,832	4,832
2014	39,069	39,069	35,518
2015	68,319	68,319	56,462
2016	97,569	97,569	73,305
2017	97,569	97,569	66,641
2018	97,569	97,569	60,583
2019	97,569	97,569	55,075
2020	97,569	97,569	50,069
2021	97,569	97,569	45,517
2022	97,569	97,569	41,379
2023	97,569	97,569	37,617
2024	97,569	97,569	34,198
2025	97,569	97,569	31,089
2026	97,569	97,569	28,262
2027	97,569	97,569	25,693
2028	97,569	97,569	23,357
2029	97,569	97,569	21,234
2030	97,569	97,569	19,304
2031	97,569	97,569	17,549
2032	97,569	97,569	15,953
TOTAL	1,770,902	1,770,902	743,637

Other costs and benefits

In addition to the costs and benefits explicitly stated so far, there are a number of costs and benefits that are not easily measured and are therefore left unquantified in this analysis.

Benefits

There may be environmental benefits that would accrue in Cicia with the implementation of the project as it has required the exclusion of non-organic pesticides and other chemicals in order to achieve organic certification for the island. Furthermore, the certification of Cicia as an organic island may pave the way for exports of other agricultural products in the future, develop organic tourism opportunities and generally build up Cicia's 'brand' as an organic, unspoiled island.

Another possible benefit from the project may be measured in terms of the empowerment of the women of Cicia. As coconut oil production is exclusively a women's activity in Cicia, the development of a locally run organic certification system, the increasing of business and entrepreneurial skills of the coconut oil producers and the extra income generated from selling oil to higher-value markets will potentially improve the status of and empower the women of the island. Men may be involved in other aspects of the production chain, but the actual extraction of oil from coconuts is a women's activity.

The project may also stimulate the growth of new markets for agricultural products from Cicia. Given the increased exposure of Cicia to export markets and operators of major resorts in the rest of Fiji, this may lead to demand for other products from the island.

Costs

Other costs that have not been quantified in this analysis include the potential for the project to displace other economic activities on the island. In particular, the organic certification of the island and the subsequent exclusion of a wide range of chemicals from the island may prevent certain economic activities from taking place. For example, the Fijian government had previously expressed its intent to construct a timber treatment facility on the island. This facility would have generated employment, but would have also involved the use of chemicals that would prevent Cicia from achieving organic certification. The plans for the timber treatment facility have been placed on hold as a result of strong objections raised by islanders who were committed to the organic plan.

Another cost that has not been quantified is the potential need for widespread replanting of coconut producing trees on the island when they cease to produce coconuts. This is difficult to assess as it is likely that replanting would occur regardless of the oil production activity due to their importance to the livelihoods of the islanders. Even without commercial VCO production, the people of Cicia make extensive use of the island's coconuts to meet their own needs.

Summary

Overall, the project scenarios are substantially more costly than the baseline, but also deliver substantially higher revenues. This is illustrated in the following figures, which display the cumulative costs of each scenario and the cumulative benefits of each scenario as measured in 2013 Fijian dollar values, followed by two figures that display the cumulative costs and then benefits, in Fijian dollars, in PV terms.

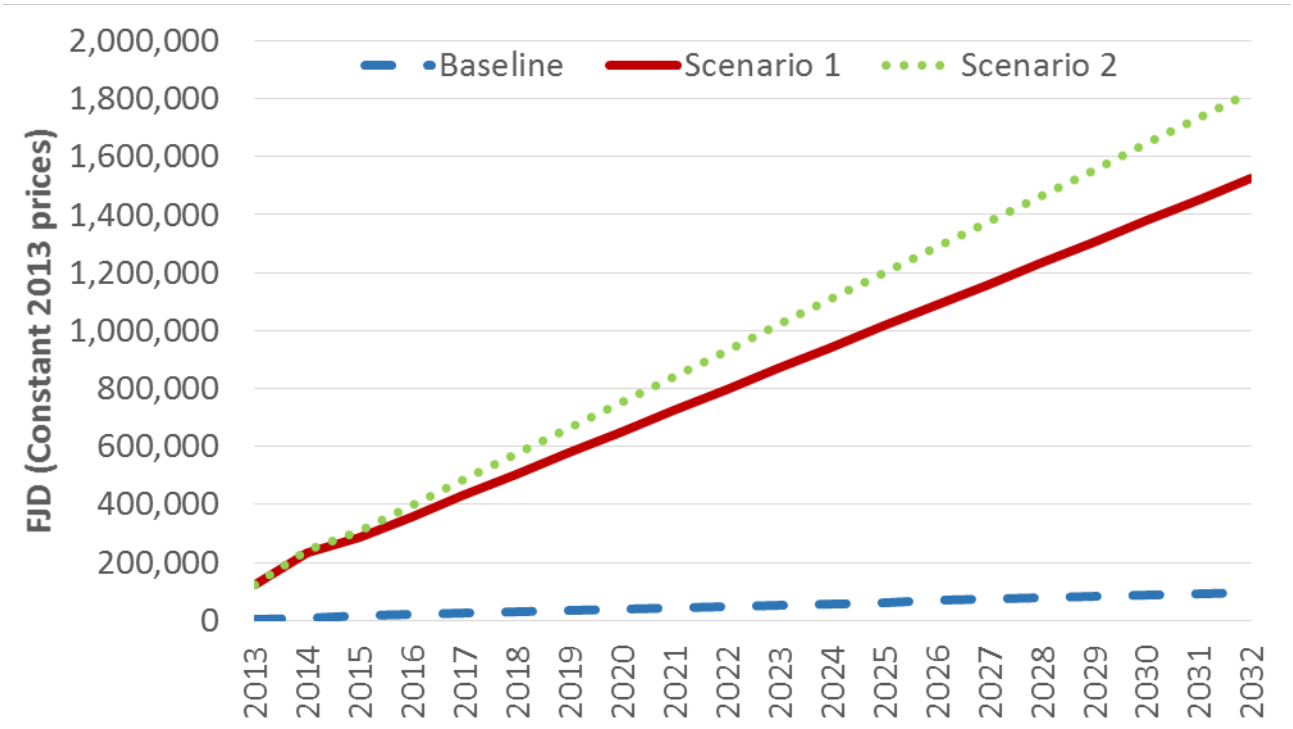

FIGURE 1. CUMULATIVE COSTS OF EACH SCENARIO

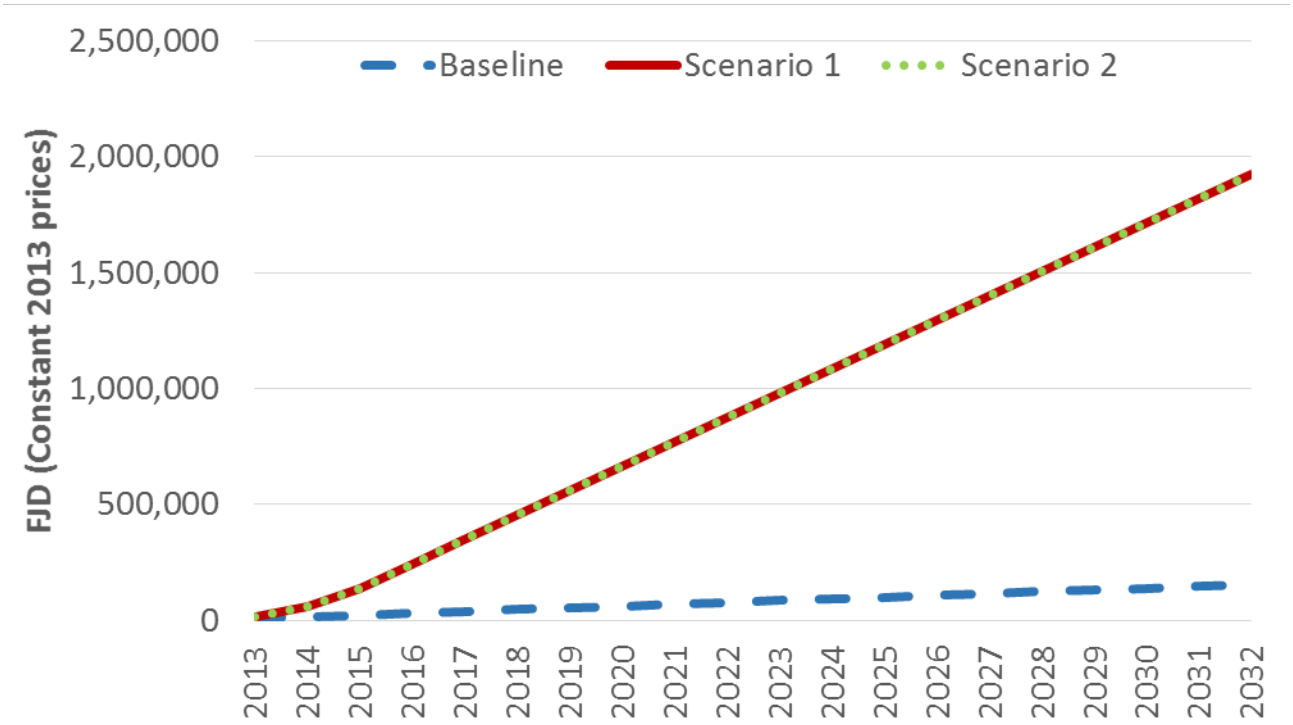

FIGURE 2. CUMULATIVE BENEFITS UNDER EACH SCENARIO

Note that the benefits under project scenarios 1 and 2 are identical, and accordingly the two lines representing the respective benefits of the two scenarios correspond.

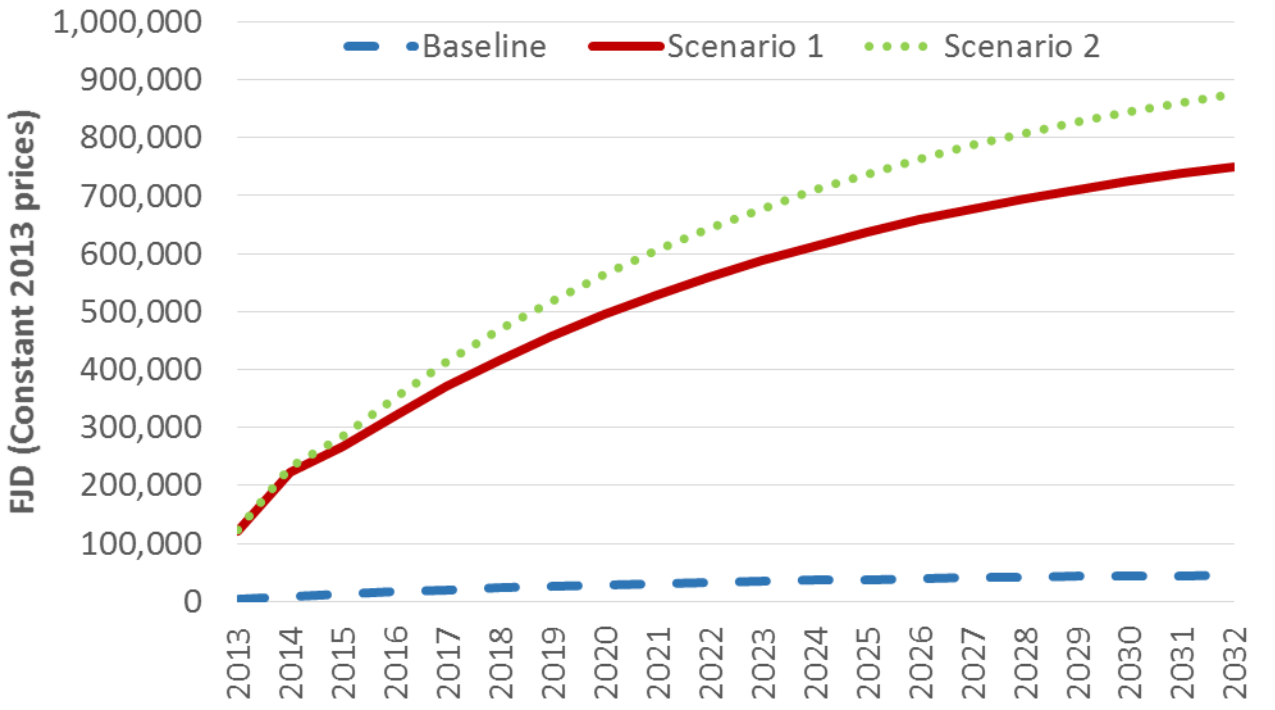

FIGURE 3. CUMULATIVE COSTS OF EACH SCENARIO, PV TERMS, 10 PER CENT DISCOUNT RATE

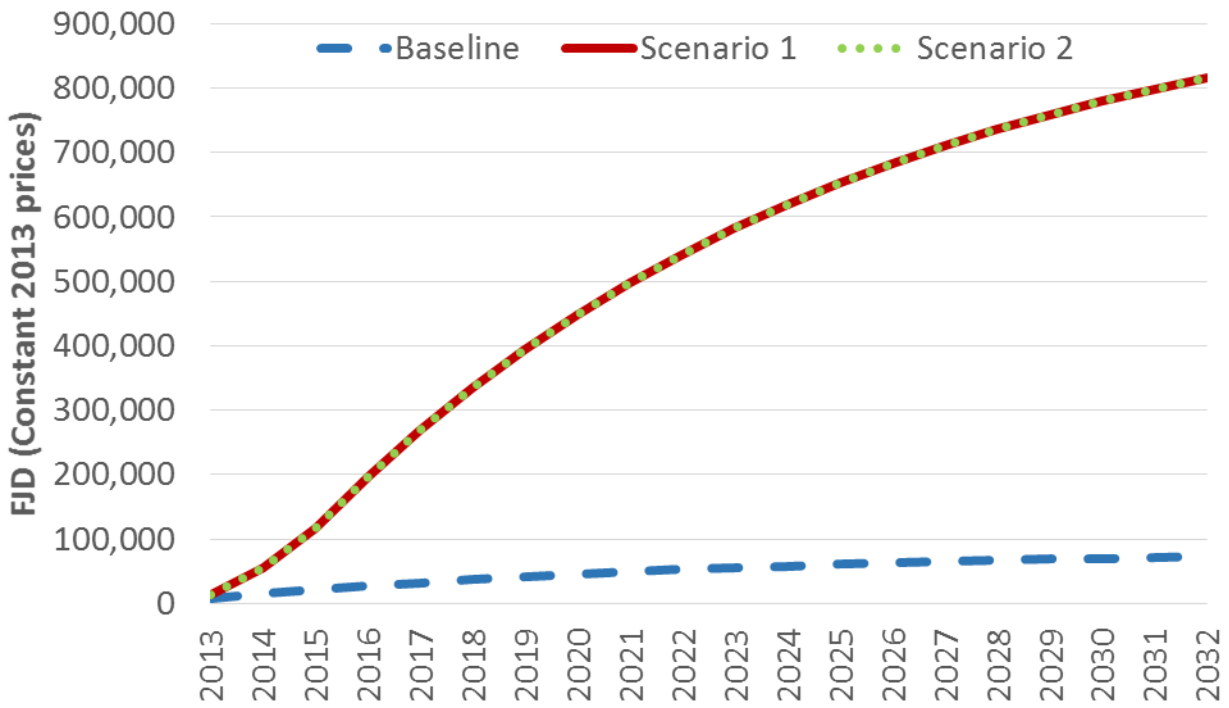

FIGURE 4. CUMULATIVE BENEFITS OF EACH SCENARIO, PV TERMS, 10 PER CENT DISCOUNT RATE

Note that the benefits under project scenarios 1 and 2 are identical, and accordingly the two lines representing the respective benefits of the two scenarios correspond.

Cost-benefit analysis results

The results of the cost-benefit analysis of the project to establish a PGS for organic certification of VCO products from Cicia are presented in this section. The outcomes of the sensitivity analysis undertaken to check the robustness of these results are also reported.

Project scenario 1

The total additional cost of the project under scenario 1 is FJD 1.43 million as measured in constant 2013 values. The total additional benefits total FJD 1.77 million in 2013 values. The present values of the costs and benefits under three different discount rates are set out in the following table. In addition to the 10 per cent selected as the central case, rates of 5 per cent and 15 per cent are used as sensitivities. Note that the costs and benefits reported do not sum up exactly to the reported net benefit as the numbers in Table 9 have been rounded to 2 significant figures.

TABLE 9. PRESENT VALUE OF COSTS AND BENEFITS OF PROJECT SCENARIO 1

	5 PER CENT REAL DISCOUNT RATE	10 PER CENT REAL DISCOUNT RATE	15 PER CENT REAL DISCOUNT RATE
BENEFITS	FJD 1.10 million	FJD 0.74 million	FJD 0.54 million
COSTS	FJD 0.96 million	FJD 0.70 million	FJD 0.56 million
NET BENEFITS	**FJD 144,000**	**FJD 39,000**	**FJD -20,000**

The net present value of the project under scenario 1 is:

- FJD 144,000 (5 per cent discount rate)
- FJD 39,000 (10 per cent discount rate)
- FJD -20,000 (15 per cent discount rate).

The benefit-cost ratio (BCR) of the project under scenario 1 as calculated by dividing the present value of total additional benefits by the PV of total additional costs under the different discount rates is as follows:

- 1.15 (5 per cent discount rate)
- 1.06 (10 per cent discount rate)
- 0.96 (15 per cent discount rate).

Under the central assumption of 10 per cent, the project under scenario 1 would return FJD 1.06 for every FJD 1 spent.

The following figure summarises the results for scenario 1.

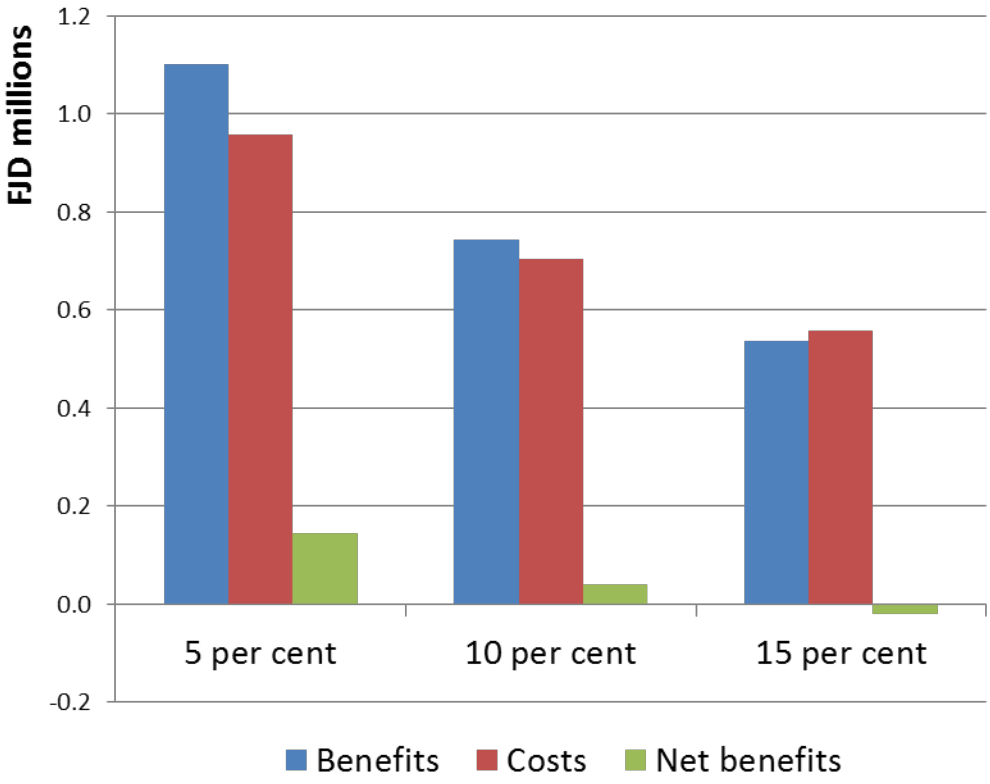

FIGURE 5. COSTS AND BENEFITS OF PROJECT SCENARIO 1 - CENTRAL AND SENSITIVITY CASES

Project scenario 2

The total additional cost of the project under scenario 2 is FJD 1.72 million in 2013 values. The total additional benefits total FJD 1.77 million in 2013 values. The present values of the costs and benefits under three different discount rates are set out in the following table. In addition to the 10 per cent selected as the central case, rates of 5 per cent and 15 per cent are used as sensitivities. Note that the costs and benefits reported do not sum up exactly to the reported net benefit as the numbers in Table 10 have been rounded to 2 significant figures.

TABLE 10. PRESENT VALUE OF COSTS AND BENEFITS OF PROJECT SCENARIO 2

	5 PER CENT REAL DISCOUNT RATE	10 PER CENT REAL DISCOUNT RATE	15 PER CENT REAL DISCOUNT RATE
BENEFITS	FJD 1.10 million	FJD 0.74 million	FJD 0.54 million
COSTS	FJD 1.14 million	FJD 0.83 million	FJD 0.65 million
NET BENEFITS	**FJD -41,000**	**FJD -86,000**	**FJD -111,000**

The net present value of the project under scenario 2 is:

- FJD -41,000 (5 per cent discount rate)
- FJD -86,000 (10 per cent discount rate)
- FJD -111,000 (15 per cent discount rate).

The benefit-cost ratio of the project under scenario 2 as calculated by dividing the present value of total additional benefits by the PV of total additional costs under the different discount rates is as follows:

- 0.96 (5 per cent discount rate)
- 0.90 (10 per cent discount rate)
- 0.83 (15 per cent discount rate).

Under the central assumption of 10 per cent, the project under scenario 2 would only return FJD 0.90 for every FJD 1 spent.

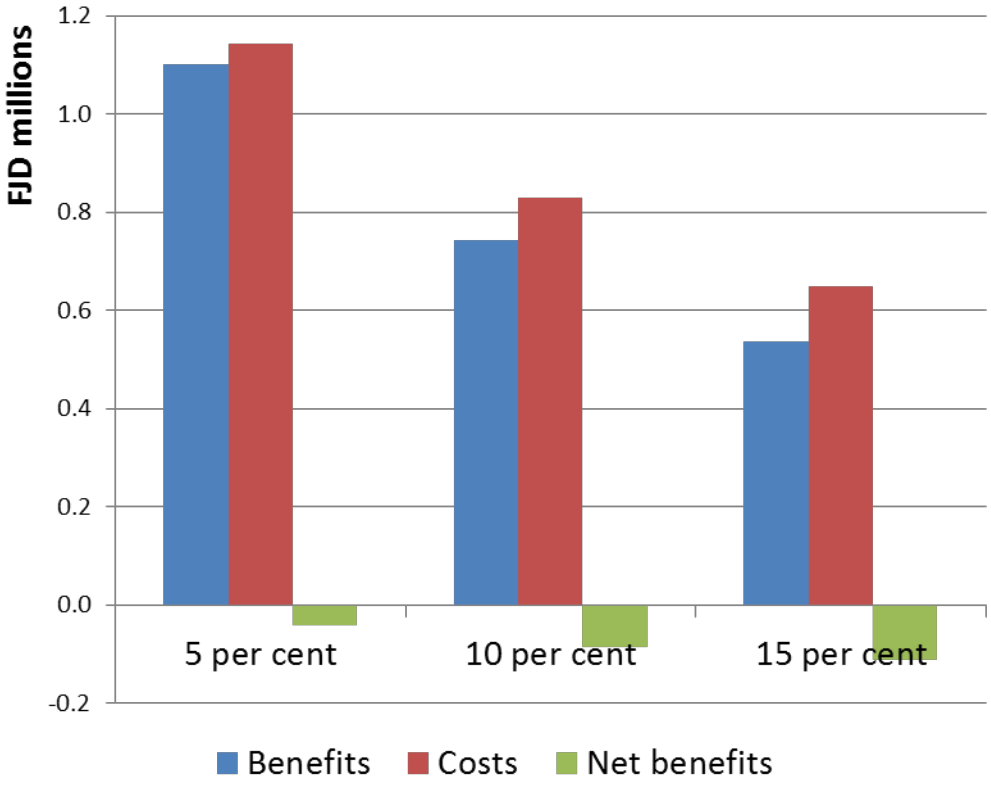

FIGURE 6. COSTS AND BENEFITS OF PROJECT SCENARIO 2 – CENTRAL AND SENSITIVITY CASES

Conclusion

The cost-benefit analysis indicates that the project to establish a PGS for organic certification of VCO products in Cicia generates a BCR of 1.06 under a 10 per cent discount rate if the opportunity cost for the islanders participating in the VCO production activities is assumed to be negligible. This indicates a positive return on the project. Under a 5 per cent discount rate, the project generates a higher BCR of 1.15, while a 15 per cent discount rate results in a low BCR of 0.96, which indicates a negative return. However, if the opportunity cost for the participants in VCO production activities is assumed to be positive (for example, equal to the Fijian national minimum wage of FJD 2 per hour) then the BCR drops below 1.0 to 0.90 under the 10 per cent discount rate, 0.96 per cent under the 5 per cent rate and 0.83 with a 15 per cent rate. This raises several issues, which will be addressed in the following discussion.

Firstly, what is an appropriate discount rate to apply to the project? As noted earlier in this report, the Asian Development Bank generally applies a discount rate of 10–12 per cent to development projects. However, CBAs conducted on projects throughout the Pacific range from 3–12 per cent (Buncle et al. 2013, pp 29–30). When considering whether the project delivered positive outcomes relative to alternative uses of the project funds, it should be compared against projects using the same discount rate. The relative merits of this project should be considered by using a common metric.

Another issue is whether the opportunity cost of the labour of the islanders participating in VCO production in Cicia should be considered to be negligible or positive. A case can be made in support of excluding the opportunity cost, effectively assuming it to be zero, on the basis that only 8 per cent of the adult population of the island is engaged in steady, paid employment. There are few employment or training opportunities on the island and the case can be made that engaging in a couple of hours of coconut oil production for several days a week would not be displacing alternative gainful employment.

However, this can be countered by the argument that the islanders value their leisure time and would prefer to engage in some other activity rather than producing coconut oil, and that coconut oil activities impose a non-monetary cost on them. On the other hand, the islanders engage in coconut oil production anyway for their own domestic household consumption. Furthermore, coconut oil production is a communal activity and can potentially be considered as a leisure activity and an opportunity for socialising with one's family and neighbours. In short there is no simple answer to the question of whether the opportunity cost of labour should be included or excluded from the analysis, which is why two scenarios were constructed and analysed. The inclusion or exclusion of the opportunity cost of labour has a pivotal impact on whether or not the project returns a net benefit under the 5 per cent discount rate case.

This also raises another question of whether the Fijian minimum wage is an appropriate indicator of the opportunity cost of labour.

In addition, there is a question about whether 20 years is an appropriate timeframe for assessing the project. Given that the project is designed to make a lasting impact on the wellbeing of the people of Cicia by achieving a sustained increase in economic opportunities by enabling access to new, higher-value export markets for their products, it is reasonable to assess its impacts over a period spanning of more than a decade. However, is 20 years an appropriate period? Given the pivotal impact of the large upfront project implementation costs in the first two years of the project, extension or contraction of the timeframe by 5 years or a decade is unlikely to materially change the outcome of the analysis.

Given the greater weighting to costs and benefits in the early years of a project in the analysis, a key factor in the evaluation of this project is the large upfront cost of around FJD 192,000 over the first two years of the project, given that the oil production activities on Cicia are estimated to generate only around FJD 8000 in revenues per year prior to the project, and only increased to around FJD 50,000 per year by the second year of the project. Another issue is the increase in production costs resulting from the higher standards of product that is demanded by the higher-value

markets targeted by the project. Production costs are estimated to have increased by around FJD 4 per litre in order to achieve an increase in revenues of around FJD 5 per litre, which yields a net gain of around FJD 1 per litre – at least for now.

However, the project implementation stage has only just been completed, and it is premature to make an assessment on the overall outcomes of the project. Even if project targets are met, the project is still unlikely to yield a positive net benefit as measured by its quantifiable direct economic outcomes. This analysis must be considered with the following limitations in mind.

- A number of non-economic benefits (such as social and environmental benefits) as well as unmeasured economic benefits (such as market diversification, export diversification, and the potential for building the reputation of Cicia as an organic island, as discussed in the report) have not been included in the quantitative analysis of this project. Conversely, a number of unquantifiable costs have also been excluded.
- The analysis assumes that the project would achieve its production, export and revenue targets. It does not consider cases where these may be exceeded or not reached. Movements in the prices received for Cicia's VCO could have a major impact on the final outcomes of the project.

Based on the analysis in this report, the project could potentially deliver a positive net benefit given a discount rate of 10 per cent and the assumption that it meets its stated market targets, with a net present value calculated at between FJD 39,000 and FJD -86,000. An interpretation of this finding is that the NPV of the additional environmental, social and economic factors not measured in this analysis, as discussed earlier in this report, will need to equal at least FJD 86,000 in order for the project to break even under this evaluation framework if the opportunity cost of labour is taken into account. However, if this cost is excluded from the analysis, the additional non-financial and indirect benefits could boost the net benefits of the project beyond the FJD 39,000 that is estimated.

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Appendix A – Parameters

The complete set of parameters underlying the scenarios adopted for this analysis is set out in the table below.

TABLE A.1 PARAMETERS

PARAMETERS	UNIT	QUANTITY
COCONUTS PER LITRE OF REGULAR COCONUT OIL	UNITS	25
COCONUTS PER LITRE OF VCO.	UNITS	30
LABOUR HOUR PER LITRE	HOURS	1
NUMBER OF HOUSEHOLDS PRODUCING VCO	HOUSEHOLDS	255
OIL USED PER HOUSEHOLD PER WEEK	LITRES	1.5
PROPORTION OF VCO PRODUCED FOR SALE - BASELINE	PER CENT	5%
ESTIMATED BASELINE OIL PRODUCTION PER HOUSEHOLD PER WEEK	LITRES	1.6
ESTIMATED TOTAL BASELINE OIL PRODUCTION	LITRES	403
VCO PRODUCED FOR SALE PER WEEK - BASELINE	LITRES	20
VCO PRODUCED FOR SALE PER WEEK - WITH PROJECT	LITRES	75
BASELINE VCO SALE PRICES - UPPER	FJD PER LITRE	18
BASELINE VCO SALE PRICES - LOWER	FJD PER LITRE	6
RETAIL PRICES IN NEW ZEALAND	NZD PER LITRE	25
SHIPPING COSTS: CICIA-SUVA	FJD PER LITRE	2
FIJI MINIMUM WAGE	FJD PER HOUR	2
VCO OUTPUT FOR SALE - APRIL 2014	LITRES PER MONTH	300
TARGET VCO OUTPUT FOR SALE	LITRES PER MONTH	675
TARGET VCO SALES REVENUE	FJD PER MONTH	8100
TARGET REVENUE PER LITRE	FJD	12
ESTIMATED MONTHLY DEMAND FOR CICIA VCO	LITRES PER MONTH	3000
BASELINE COMMERCIAL VCO PRICE	FJD PER LITRE	8
PROJECT COMMERCIAL VCO PRICE	FJD PER LITRE	13
POETCOM BUDGET - CICIA	FJD	191,900
ESTIMATED BASELINE QUANTITY OF VCO PRODUCED FOR SALE	LITRES PER MONTH	81
ESTIMATED INCREASE IN PRODUCTION OF VCO FOR SALE	LITRES PER MONTH	219
CAPACITY OF BUCKET	LITRES	15
COST OF BUCKET	FJD	13
ESTIMATED LIFE OF BUCKET	YEARS	3
PRODUCTION COST - BASELINE	FJD PER LITRE	5
PRODUCTION COST - PROJECT	FJD PER LITRE	9
DISCOUNT RATE - CENTRAL	PER CENT	10
DISCOUNT RATE - SENSITIVITY (LOWER BOUND)	PER CENT	5
DISCOUNT RATE - SENSITIVITY (UPPER BOUND)	PER CENT	15

Appendix B - Costs

This section sets out the assumptions underlying the production costs assumptions for the baseline and project scenarios. The cost of production under each scenario is calculated by multiplying the expected quantity of oil produced for sale, as measured in litres, by the assumed cost of producing oil for sale, as measured in FJD per litre. Production costs include shipping costs, and packaging costs. Note that the opportunity cost of labour is excluded from the production costs.

Table B.1 sets out the production costs assumed for the baseline. It is assumed that the real cost of production does not change and that the annual quantity of oil produced for sale does not change.

TABLE B.1 PRODUCTION COSTS ASSUMPTION - BASELINE

COST ELEMENT	UNIT	2013-2032
QUANTITY OF OIL PRODUCED FOR MARKET	LITRES	966
COST OF PRODUCING OIL FOR MARKET	FJD PER LITRE	5
TOTAL COST OF PRODUCTION	**FJD**	**4832**

Table B.2 sets out the costs of production assumed for the two project scenarios. The production costs are the same for both. As described in the body of the report, the opportunity cost of labour is incorporated into Project scenario 2 as a separate cost. It is assumed that the cost of producing oil for sale does not change in real terms over the life of the project. Another assumption is that the quantity produced for sale gradually increases from 2013 levels of 966 litres to the target level of 8,100 litres by 2016, remaining constant at that level for the remainder of the project.

TABLE B.2 PRODUCTION COSTS - PROJECT SCENARIOS (EXCLUDING OPPORTUNITY COST OF LABOUR)

COST ELEMENT	UNIT	2013	2014	2015	2016-2032
QUANTITY OF OIL PRODUCED FOR MARKET	LITRES	966	3,600	5,850	8,100
COST OF PRODUCING OIL FOR MARKET	FJD PER LITRE	9	9	9	9
TOTAL COST OF PRODUCTION	**FJD**	**8,697**	**32,400**	**52,650**	**72,900**

Table B.3 sets out the estimates of the opportunity cost of labour incurred by the oil producers as included in the total cost estimates of Project scenario 2. Opportunity cost is calculated by multiplying the opportunity cost of labour, defined in terms of FJD per litre, by the quantity of oil produced for sale.

TABLE B.3 OPPORTUNITY COST OF LABOUR - PROJECT SCENARIO 2

COST ELEMENT	UNIT	2013	2014	2015	2016-2032
QUANTITY OF OIL PRODUCED FOR MARKET	LITRES	966	3,600	5,850	8,100
OPPORTUNITY COST OF LABOUR	FJD PER LITRE	2	2	2	2
TOTAL COST OF PRODUCTION	FJD	1,933	7,200	11,700	16,200

The opportunity cost is based on the 2013 Fiji national minimum wage of FJD 2 per hour, and the assumption that the production of 1 litre of oil requires 1 hour of labour, producing the assumption of FJD 2 per litre. It is assumed that the minimum wage remains at $2 per hour in real terms to 2032. It is expected that the minimum wage will increase over time in nominal terms to keep pace with inflation, but this is not relevant to this analysis, as the cost benefit analysis is conducted in real, not nominal terms. That is, the impact of inflation is excluded.