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Solomon Islands Smallholder Agriculture Study

Volume 3
Markets and Marketing Issues

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Acronyms

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BSI	Body Shop International
CBSI	Central Bank of the Solomon Islands
CEMA	Commodities Export Marketing Authority
CIDA	Canadian International Development Agency
cif	cost, insurance and freight
CPRF	Community Peace and Restoration Fund
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAL	Department of Agriculture and Livestock
dbh	diameter at breast height
DCRS	Dodo Creek Research Station
DME	direct micro-expeller (coconut oil mills)
DRC ratio	domestic resource cost ratio — a measure of economic comparative advantage
EU	European Union
fob	free on board
FAO	Food and Agriculture Organization of the United Nations
ffa	free fatty acid
FOSFA	Federation of Oils, Seeds and Fat Association
g	grams
GDP	gross domestic product
GM	gross margin
GPL	Guadalcanal Plain Limited
ha	hectare
HIV	human immunodeficiency virus
ICO	International Cocoa Organisation
IDA	Isabel Development Authority
IRR	internal rate of return
ITC	information and telecommunications technology
K	kernels
kg	kilograms
KGA	Kastom Gaden Association
KIT	kernels in testa
KPSI	Kokonut Pacific (Solomon Islands) Ltd
LPL	Levers Plantation Limited
m	metres
MAF	Ministry of Agriculture and Fisheries (Solomon Islands)
MAFFAM	Ministry of Agriculture, Forests, Fisheries and Meteorology (Samoa)
MIS	market information system
MSG	Melanesian Spearhead Group
N	nuts
NASAA	National Association for Sustainable Agriculture, Australia
NBPOL	New Britain Palm Oil Ltd
NIS	nut-in-shell
NFR	Novel Food Regulation (EU import regulation)
NGO	nongovernment organisation
NPV	net present value
NZAID	New Zealand's International Aid and Development Agency
OBM	outboard motor (powered canoes)
PEQ	post-entry quarantine
PG	Pacific Green (Fiji-based coconut furniture business)
PIC	Pacific Island country
PFN	People First Network
PNG	Papua New Guinea

r(i)	rate of interest
RIPEL	Russell Islands Plantation Limited
ROC	Republic of China
SDR	special drawing rights — International Monetary Fund currency unit (based on a basket of currencies) (On 22 July 2005, 1 SDR = US$1.46)
SED	Small Enterprise Development Programme (of UNDP)
SI	Solomon Islands
SIBC	Solomon Islands Broadcasting Commission
SIDB	Solomon Islands Development Bank
SIEA	Solomon Islands Electricity Authority
SIG	Solomon Islands Government
SIPL	Solomon Islands Plantation Limited
SME	small and micro enterprise
SPC	Secretariat of the Pacific Community
SPITIC	South Pacific Islands Trade and Investment Commission
SPREP	South Pacific Regional Environmental Programme
STABEX	commodity stabilisation funds
US	United States
UNDP	United Nations Development Programme
WIB	Women in Business — Samoan NGO
WKK	WKK shipping company

Currency convention

The currency used throughout, unless otherwise stated, is the Solomon Island dollar (SI$), with an exchange rate of SI$1.00 = A$0.20 in September 2004.

Figure 1 Map of Solomon Islands, showing the main island groups

Preface

THE *SOLOMON ISLANDS SMALLHOLDER AGRICULTURE STUDY* IS A SERIES OF FIVE VOLUMES WHICH DOCUMENT THE DEVELOPMENT OF RECOMMENDATIONS FOR A SET OF AGRICULTURAL INTERVENTIONS SUPPORTING BOTH SUBSISTENCE AGRICULTURE AND INCOME-GENERATING ACTIVITIES FOR RURAL COMMUNITIES IN SOLOMON ISLANDS (SI).

It presents recommendations for the implementation of the study findings, as well as some of the background research that provides the rationale for their development.

The series is based on studies in SI from September to November 2004. The 13-person study team (see Appendix 1.2 for member biographies) consisted of Matthew Allen, Mike Bourke (co-leader), Barry Evans, Ellen Iramu, Roselyn Kabu Maemouri, Andrew McGregor, Ben Mullen, Alice Aruheeta Pollard, Morgan Wairiu, Claudine Watoto and Stav Zotalis (co-leader). AusAID staff members, Geoff Fox and Nadira Mailewa, also contributed, and Sarah Goulding guided the process. Assistance was received from many people in SI. In particular, field staff of the AusAID-funded Community Peace and Restoration Fund (CPRF) facilitated the fieldwork in the provinces.

The studies were conducted in two phases:

- Phase 1 involved a five-week study, which was undertaken from August to September 2004 in Brisbane, Canberra and Honiara by Barry Evans, with technical assistance from Mike Bourke and others. The report of this study has been included in this series as Volume 5, *Literature Review: A Brief National Assessment of the Agriculture Sector*.
- Phase 2 involved a comprehensive in-country study of the agricultural sector. The study was conducted over a period of five weeks in SI from September to October 2004. The team undertook visits to seven of the nine provinces in SI, and information on the remaining two provinces was based on interviews and information gathered during previous visits by some team members. This study was complemented by the work undertaken by Andrew McGregor (a marketing specialist) on marketing issues, which was completed in November 2004 (see Volume 3).

The smallholder agriculture study complements the work undertaken under the broader Australian program of assistance to SI, which focuses on interventions in the law and justice sector, machinery of government, economic governance, health and education sectors, and the community development sector, as well as small-scale interventions focused on promoting peace building.

Volume 1, *Main Findings and Recommendations,* draws on the findings of the two-phased study to present a series of recommendations for enhancing rural livelihoods in SI, including recommendations for interventions to implement the study. Appendix 1.1 provides a cost–benefit analysis by Andrew McGregor of the proposed recommendations, which includes a detailed analysis of returns to both labour and land, as well as information on international market prices for current and potential export crops.

Volumes 2–5 contain considerable support material for the recommendations that are developed in Volume 1.

Volume 2, *Subsistence Production, Livestock and Social Analysis*, covers livestock issues (Ben Mullen), an overview of subsistence agriculture (Tony Jansen), and gender, social and cultural issues (Alice Aruheeta Pollard).

Volume 3, *Markets and Marketing Issues*, was written by Andrew McGregor and describes the detailed marketing analyses on which Volume 1 is based. In particular, Volume 3 provides justification for the recommended interventions that are detailed in Chapter 10 of Volume 1.

Volume 4, *Provincial Reports*, comprises individual reports on the constraints and opportunities for agricultural interventions in the nine provinces. They cover Central (Matthew Allen, principal author), Choiseul (Matthew Allen and Ben Mullen), Guadalcanal (Mike Bourke), Isabel (Morgan Wairiu), Makira (Morgan Wairiu and Ben Mullen), Malaita (Mike Bourke), Rennell and Bellona (Barry Evans), Temotu (Morgan Wairiu) and Western (Barry Evans) provinces. Each provincial report was based on four to seven days of fieldwork per province, except for Choiseul and Temotu, which were based on interviews and other sources.

Volume 5, *Literature Review: a Brief National Assessment of the Agriculture Sector*, was written by Barry Evans and gives a broad overview and assessment of information on the agriculture sector in SI.

Volume 1 of this study was sent to a number of SI and Australian Government departments, several international development organisations and two academic referees for comments and review. The SI departments consulted were Agriculture and Livestock, the Central Bank, and National Reform and Planning. The Australian Government departments were Finance, Foreign Affairs and Trade, and Treasury. Other agencies that commented on the draft document were the Asian Development Bank, the European Union, New Zealand Aid and the World Bank. One academic referee was based in Australia, the other in the United Kingdom. The comments that were received have been incorporated in the final version where possible.

Summary

SOLOMON ISLANDS (SI) HAS A HIGHLY DUALISTIC ECONOMY THAT DEPENDS ON AGRICULTURE. EVEN BEFORE THE ETHNIC TENSION OF 1998–2003, MOST OF THE RURAL POPULATION SURVIVED ON AN ANNUAL CASH INCOME OF LESS THAN US$300.

The population was fortunate to have had a strong subsistence base for support. The ability of people to feed themselves during the loss of cash income, displacements and fighting associated with the ethnic tension bears testimony to the strength and importance of the subsistence agriculture sector.

The relatively good past performance of the SI tree-crop industries can be explained by a combination of factors:

- a competitive advantage of SI smallholders in growing these crops
- the absence of alternative income-earning opportunities compared with producers in Tonga, Samoa and, to some extent, Fiji
- a functioning marketing system, although imperfect, compared with a number other Pacific Island countries (PIC) tree-crop industries
- a depreciating exchange that has favoured agricultural industries.

The ongoing recovery of the SI coconut and cocoa industries provides an encouraging base for growing rural livelihoods. It is doubly fortunate that both commodities are enjoying a period of favourable prices. The prospects for the oil palm industry are now more positive with the decision of a Papua New Guinea (PNG) company to invest in the rehabilitation of Solomon Islands Plantations Ltd (SIPL).

There are good prospects for the SI industrial tree crop sector to return to, and even expand beyond, pre-ethnic tension levels. Indigenous nuts offer significant opportunities. Profitable export markets are available for a number of spices and other minor products. There are very substantial opportunities for import substitution, particularly for traditional staples, fresh fruit and vegetables and livestock products.

The main commodities or commodity groups considered in this review are coconuts, oil palm, cocoa, food crops, indigenous nuts and livestock products. For each major commodity, consideration is given to financial and economic viability; market opportunities; marketing arrangements and performance; marketing problems and constraints; and prospects for industry rehabilitation. Recommendations are made on how marketing, rehabilitation and expansion might be improved. These are listed below.

RECOMMENDATIONS FOR IMPROVING AGRICULTURAL MARKETING, REHABILITATION AND EXPANSION IN SI

AGRICULTURAL PRODUCT OR ISSUE	RECOMMENDATION
Coconuts	1. Expand the CPRF pilot copra dryer distribution program 2. Support a promotional campaign to encourage the increased use of virgin coconut oil on the local market 3. Provide marketing support for virgin coconut oil 4. Provide a small, once-off injection of working capital for buying agents in more remote locations 5. Construct a small jetty at Malu'u on North Malaita 6. Provide ongoing technical assistance in the development of biofuel 7. Re-establish a small coconut seed garden network
Oil palm	No specific interventions for AusAID involvement have been identified; however, there may be future opportunities to work with NBOPL to facilitate smallholder participation in the industry
Cocoa	1. Include steel flues for cocoa driers as part of the CPRF copra drier program 2. Rebuild the centralised cocoa facility at Marasa on the Guadalcanal Weather Coast 3. Include cocoa in support provided for organic certification 4. Facilitate the introduction of improved black pod-resistant varieties of cocoa from PNG 5. Employ or attach a cocoa specialist in DAL
Food and fresh produce	1. Upgrade urban and provincial markets 2. Provide marketing information 3. Propagate and distribute improved fruit and vegetable planting material 4. Support a program of on-farm trials for new, improved planting material 5. Provide horticultural technical expertise to work with DAL and appropriate NGOs 6. Facilitate road rehabilitation and upgrading
Rice	1. Complete a comprehensive study on the comparative advantage of rice and other staple food crop production in SI, to improve agricultural policy formulation for rice production
Indigenous tree nuts	1. Recognise, at the national policy level, the unique and substantial economic opportunity offered by indigenous nuts 2. Include nuts in SI trade and investment promotion efforts 3. Provide diplomatic representation to the EU on the NFR 4. Develop appropriate handling techniques for fresh nuts 5. Provide continued identification of superior propagation material for cloning 6. Provide continued evaluation of planting material for commercial cultivation 7. Provide continued development of appropriate harvesting and processing techniques 8. Develop appropriate packaging for fresh and processed nuts 9. Support general agronomic research for establishing nut orchards.
Vanilla	1. Provide existing and potential farmers with information on where vanilla can be successfully grown, how it should be grown and, most importantly, how it can be successfully cured (this can be done through a pictorial manual and through workshops) 2. Provide support for restocking and propagating vanilla planting material in North Guadalcanal
Chillies	1. Increase planting material for chilli production for the Soltai factory at Noro 2. Train villagers in postharvest handling and drying of chillies 3. Prepare a pictorial manual on the growing, postharvest handling and drying of chillies in SI 4. Provide support and assistance for Soltai, DAL, CEMA and growers to re-establish chilli supply chains by promoting chilli production and developing provincial grower groups
Ginger and turmeric	1. Develop a comprehensive pest list for ginger in SI as a first step in accessing the New Zealand market 2. DAL to acquire the technical and organisational ability to certify ginger free of from the nematode pest *Radophilus simulis*, to help in accessing the Japanese market 3. Ask Australia to re-examine its quarantine ban on ginger from PICs
Coffee	1. Provide assistance for niche marketing of SI coffee

AGRICULTURAL PRODUCT OR ISSUE	RECOMMENDATION
Livestock products	1. Improve subsistence and small-scale commercial pig production in all provinces 2. Develop small- and medium-scale commercial pig production in Guadalcanal and Malaita 3. Improve the productivity of subsistence poultry systems throughout SI 4. Improve participation of smallholder poultry farmers in supplying commercial markets in the provincial capitals 5. Re-establish medium-scale poultry production units on Guadalcanal 6. Re-establish smallholder cattle production in provinces for supply of beef to commercial markets in the provincial capitals and Honiara 7. Support the continued development of honey production for supply of local and export markets and to increase the number of people involved in the industry
Cross-commodity issues	1. Rehabilitate and upgrade roads 2. Provide incentives for the shipping industry to better service remote locations 3. Expand the IT network to service at least all the main provincial centres 4. Promote farm-supply businesses 5. Develop a market information system similar to the one outlined in Appendix 3.8 6. Resume and expand the CBSI loan guarantee scheme 7. Make funds available for a loan scheme for rural areas managed by a commercial bank (commercial bank loans could be considered)

CBSI = Central Bank of Solomon Islands, CEMA = Commodities Export Marketing Authority, CPRF = Community Peace and Restoration Fund, DAL = Department of Agriculture and Livestock, EU = European Union, IT = information technology, NBOPL = New Britain Palm Oil Ltd, NFR = Novel Food Regulation (EU import regulation), NGO = nongovernment organisation, PICs = Pacific Island countries, PNG = Papua New Guinea, SI = Solomon Islands.

SI has not been successful in developing nontraditional agricultural exports. In export diversification, the country has lagged behind Fiji (root crops, fresh fruit and vegetables, ginger), Tonga (squash and vanilla), Vanuatu (beef, kava, spices and indigenous nuts) and PNG (vanilla). The poor performance in this area can be explained by a combination of factors, including a weak entrepreneurial private sector, poor quarantine status, and a lack of suitable transportation links to export markets.

Without progress in the diversification of its smallholder agriculture, SI remains highly vulnerable to the vagaries of international commodity markets. Past efforts have shown successful diversification remains a complex and elusive goal to achieve. Given the constraints faced, the country is fortunate that it still maintains a strong subsistence and tree-crop commodity base.

1 Introduction

THIS VOLUME IS THE THIRD OF FOUR VOLUMES ON THE CONTRIBUTION OF AGRICULTURE TO BROAD-BASED GROWTH IN SOLOMON ISLANDS (SI). IT DESCRIBES THE DETAILED MARKETING ANALYSES ON WHICH VOLUME 1 IS BASED. IT IS INTENDED TO BE A SELF-CONTAINED DOCUMENT AND THEREFORE SOMETIMES OVERLAPS SECTIONS OF OTHER VOLUMES.

The main commodities or commodity groups considered in this review are coconuts, oil palm, cocoa, food crops (including fruit and vegetables, rice and coffee), high-value niche commodities and livestock products. For each major commodity the following areas are covered:

- the industry situation
- financial and economic viability
- market opportunities
- marketing arrangements and performance
- marketing problems and constraints
- recommendations on how marketing might be improved
- prospects for industry rehabilitation and expansion
- suggested interventions to assist rehabilitation and expansion.

This volume also evaluates the potential for a number of minor or new diversification products. These products include spices (particularly vanilla and chillies) and the tropical fruit tree known as the medicinal fruit, noni. In each case, market prospects and economic and financial viability are considered. A number of cross-commodity opportunities are reviewed, including organic certification (and fair trade certification) and small-scale agroprocessing. Some major cross-commodity issues that relate to agricultural marketing and livelihood generation are analysed, including investment in public infrastructure (roads, shipping, telecommunications); market and marketing information; the production and distribution of farm supplies and planting material; and the finance and investment crisis.

MARKETING AND AGRICULTURE IN SOLOMON ISLANDS

There are three major constraints to the profitable marketing of most of the commodities produced in SI. These are exceptionally poor transportation conditions, absence of rural finance and lack of information. Poor transport poses a major barrier to the profitable movement of agricultural products to market. The absence of finance equates to inadequate investment in processing and marketing facilities and insufficient working capital for wholesalers and traders to operate efficiently. An effective marketing system depends on the free flow of accurate information between sellers and buyers. Farmers need to know who the buyers are, what prices are on offer and what costs are incurred in reaching the buyer. They also need to know what the quality requirements of the market are, how these requirements are met, and what the rewards are from achieving these standards.

The proper role of government is to provide support for private sector growth by helping it to produce and profitably market its products. In this context the private sector includes small farmers, traders and wholesalers as well as larger agribusiness

companies. Pacific Island governments have often regarded small farmers as different from the private sector, and this has led to fundamental flaws in the formulation of agricultural policy.

There are good prospects that the SI industrial tree crop sector (coconuts, cocoa and oil palm) will return to the levels experienced before the ethnic tension, and even expand beyond. Indigenous nuts offer significant opportunities. Profitable export markets are available for a number of spices and other minor products. There are substantial opportunities for import substitution in the domestic market, particularly for traditional staples, fresh vegetables and fruit, and livestock products.

SI is a highly dualistic economy. Even before the tension, most of the predominantly rural population survived on an annual cash income of less than US$300. The *Sustainable Human Development Report* for SI notes:

... despite some degree of diversification of the export economy, primarily based on fisheries, palm oil, timber and copra, Solomon Islands has failed to generate an annual growth rate of GDP significantly above the high rate of population growth, such that their average real living standards have stagnated. (United Nations Development Programme [UNDP] 1998)

This situation was greatly exacerbated by the political turmoil that engulfed the country during the ethnic tension of 1998–2003. The population was fortunate to have had a strong subsistence base to fall back on.

In 1995, it was estimated that agriculture's share of the gross domestic product (GDP) was 33.2%, which was reduced from 39.3% in 1980 (Asian Development Bank (ADB) 1998). Around 85% of the population live in rural villages and are heavily dependent on subsistence agriculture. Estimates provided by the study team highlight just how important this subsistence base has been and will continue to be for the foreseeable future (see Table 1.1). The ability of people to feed themselves during the loss of cash income, displacements and fighting associated with the ethnic tension of 1998–2003 bears testimony to the strength and importance of this sector.

Table 1.1 Estimated production of staple food crops in Solomon Islands, 2004

CROP	ESTIMATED PRODUCTION (TONNES PER YEAR)	PROPORTION OF PRODUCTION (%)
Sweet potato	280 000	65
Cassava	51 000	12
Banana	34 000	8
Taro and kongkong taro	32 000	7
Coconut	26 000	6
Pana and yam	7 000	2
Other	2 000	0
Total	432 000	100

Source: See Volume 1, Section 8.1

The Ministry of Finance's Village Resources Survey 1995–96 provides excellent information on the structure of the rural economy (Ministry of Finance 1997). This survey covered 4174 villages and 52 404 households (about 74% of the population). It found that cassava and sweet potato are the most important subsistence crops, grown by 96% of the surveyed villages. Copra is by far the most important cash crop, followed by cocoa, sweet potato, betel nut and sugarcane (see Table 1.2). Almost 60% of the country's villages made copra and nearly 40% grew cocoa.

A quick look at macroeconomic aggregates would suggest that SI had created a much lower dependency on agricultural exports than neighbouring Vanuatu. However, these aggregates are misleading due to the high level of unsustainable round log exports from SI. The volume of log exports doubled over the period 1990–96; in 1996 it was officially valued at $366 million, compared with $111 million for the three tree crop sectors combined (coconut, cocoa and oil palm). However, harvesting rates at the time were two to three times the available sustainable yields from the remaining natural forests. On this basis, it was predicted that the commercial forestry resource would be depleted between 2005 and 2010 (ADB 1998).

The Village Resources Survey showed that palm oil products, coconut products and cocoa were the most important agricultural exports. Until the closure of

Table 1.2 Number of villages growing crops in provinces: results of 1995–96 survey

	CHOISEUL	WESTERN	ISABEL	CENTRAL	RENNELL/BELLONA	GUADALCANAL	MALAITA	MAKIRA/ULAWA	TEMOTU	TOTAL	% OF VILLAGES
Cocoa	24	25	119	79	0	494	659	169	57	1 626	39.0
Copra	312	281	163	92	1	550	571	275	132	2 377	56.9
Betel nut	221	134	65	106	0	319	207	183	8	1 243	29.8
Coffee	1	0	8	0	0	4	3	0	0	16	0.4
Oil palm	0	1	0	0	0	7	0	0	0	8	0.2
Spice	2	16	1	2	0	6	51	0	3	81	1.9
Taro	210	78	3	118	1	102	133	152	0	797	19.1
Sweet potato	267	268	1	119	1	325	258	227	2	1 468	35.2
Yam	261	160	1	119	1	148	148	175	1	1 014	24.3
Cassava	265	264	0	119	1	239	146	149	1	1 184	28.4
Bean	263	255	3	120	1	241	149	161	0	1 193	28.6
Tomato	259	233	3	120	1	217	137	158	0	1 128	27.0
Sugarcane	266	225	1	121	1	292	151	189	0	1 246	29.9
Other	8	85	5	1	0	57	111	78	0	345	8.3

Source: Ministry of Finance (1997)

the Solomon Islands Plantation Limited operation in 2000, palm oil was by far the most important agricultural commodity export (see Table 1.3). In 1998, the export of oil palm peaked at nearly 37 000 tonnes (palm oil and palm kernel), valued at $94 million. This represented 58% of agricultural exports and 17% of total exports. Palm oil is almost entirely a plantation crop, reducing the multiplier impact of these exports. In contrast, copra and cocoa have become almost entirely small farmer crops and have provided much stronger backward linkages into the rural economy.

In the two decades before 1999, SI was able to maintain a steady level of both copra and cocoa production. This was in contrast to the situation prevailing in other Pacific Island countries (PICs). For Tonga, coconut products constituted nearly 80% of visible exports 20 years ago; today they are less than 2%. In Samoa, copra and copra oil exports dropped from a combined total of 15 000 tonnes in 1997 to nil in 2001 and to just 2000 tonnes in 2003. Samoa was exporting more than 5000 tonnes of cocoa in the late 1960s; it now produces barely enough to meet local market requirements. In Fiji, coconuts are the traditional cash crop of the outer islands. In the mid-1960s, production exceeded 40 000 tonnes; today Fijian copra production has fallen to below 4000 tonnes. In the 1980s, Fiji was exporting around 1000 tonnes of cocoa annually; this has now fallen to less than 100 tonnes. Over the past two decades, Vanuatu's copra production has oscillated between 25 000 and 45 000 tonnes; this large variation in production can be attributed to the impact of cyclones — something that SI generally does not have to cope with. Vanuatu's cocoa exports have halved since the early 1980s and are now approximately 1200 tonnes. At the beginning of the 1990s, Papua New Guinea (PNG) was exporting around 50 000 tonnes of copra and about the same amount of coconut oil. In 2002, copra exports were 15 200 tonnes and oil exports were 36 500 tonnes. Over the same period, there were also significant declines in PNG cocoa exports, although these can be largely attributed to the Bougainville crisis. The

Table 1.3 Solomon Island commodity exports, 1987–2004

		COCONUT OIL		COPRA		OIL PALM (PALM OIL AND PALM KERNEL)		COCOA		LOGS		FISH	
	EXCHANGE RATE (SI$1/US$1)	Amount ('000 tonnes)	Value (SI$ million fob)	Amount ('000 tonnes	Value (SI$ million fob)	Amount ('000 tonnes	Value (SI$ million fob)	Amount ('000 tonnes	Value (SI$ million fob)	Amount ('000 cm^3)	Value (SI$ million fob)	Amount ('000 tonnes)	Value (SI$ million fob)
1987	2.00			27.9	9.5	14.0	8.8	2.7	9.5		41.8		50.2
1988	2.11			27.2	14.9	16.9	16.5	2.6	7.4		40.7		74.9
1989	2.34			35.1	20.6	29.1	22.7	3.2	7.9		46.9		65.1
1990	2.53	3.0	2.5	32.6	10.9	28.4	19.3	3.5	11.4	399	67.4	18.0	53.1
1991	2.72	2.0	1.9	29.0	10.3	26.7	20.9	4.3	13.7	291	76.4	43.1	106.4
1992	2.93	3.4	5.5	27.8	21.3	37.1	35.8	4.5	14.4	543	128.3	33.7	87.9
1993	3.18	3.4	4.7	30.1	18.5	37.7	38.1	3.9	16.8	591	242.6	21.9	82.6
1994	3.29	.5	2.0	18.1	19.7	22.8	44.2	2.6	12.5	659	266.6	31.6	99.1
1995	3.41	1.5	4.1	28.8	32.8	37.1	72.0	3.5	13.4	749	300.9	49.5	145.7
1996	3.55	2.5	5.7	16.2	23.5	34.3	63.1	3.0	12.9	833	366.5	29.9	105.3
1997	3.73	5.6	12.5	26.4	36.7	36.7	74.4	3.6	17.0	690	278.2	34.6	129.8
1998	4.82	7.2	19.3	18.3	27.5	36.9	94.2	3.5	22.8	513	151.9	34.1	129.1
1999	4.93	10.3	na	23.2	39.3	16.1	65.1	2.4	24.3	628	250.1	47.9	158.0
2000	5.11	8.6	na	19.0	34.7	0	0	2.3	9.2	541	224.4	21.1	41.2
2001	5.30	0	0	1.7	.4	0	0	2.0	4.5	493	190.4	17.7	37.3
2002	6.78	0	0	1.7	2.2	0	0	2.9	27.7	550	254.1	18.5	70.7
2003	7.51	0	0	14.8	7.8	0	0	4.6	53.2	714	371.4	29.0	82.8
2004	7.48	0	0	22.1	39.2	0	0	4.8	40.4	1043	468.2	27.3	132.0

fob = free on board

a The 2004 data are projections of the Commodities Export and Marketing Authority, based on production in the first 8 months of the year.

Source: Central Bank of Solomon Islands Quarterly Report (various issues)

copra industries in all other PICs have, from time to time, enjoyed price subsidies; until recently, this was not a feature of the SI industry.

The relatively good performance of SI tree crop industries can be explained by a combination of factors:

- a competitive advantage of SI smallholders in the growing of these crops
- the absence of alternative income-earning opportunities compared with producers in Tonga, Samoa and, to some extent, Fiji
- a functioning marketing system, albeit imperfect, compared with a number of other PIC tree crop industries
- a depreciating exchange that has favoured agricultural industries.

There are now realistic prospects of SI tree crop industries returning to 1998 levels and beyond within a relatively short timeframe. The recovery of the SI coconut and cocoa industries, starting in 2003, provides an encouraging base for growing rural livelihoods. It is doubly fortunate that both commodities are enjoying a period of favourable prices. A highly reputable PNG oil palm company has decided to invest in the rehabilitation of the Guadalcanal oil palm industry.

SI has not been successful in developing any nontraditional agricultural exports, despite efforts to develop indigenous tree nut exports. In this area, it has lagged behind Fiji (root crops, fresh fruit and vegetables, ginger), Tonga (squash and vanilla), Vanuatu (beef, kava, spices and indigenous nuts) and PNG (vanilla). The relatively poor performance in the area of nontraditional agricultural exports can be explained by a combination of factors, including:

- a weak entrepreneurial private sector
- poor quarantine status, particularly with respect to fruit flies
- lack of suitable transportation links to export markets.

Rice is again at the forefront of SI import substitution efforts. This donor-driven initiative has little prospect of success without heavy subsidisation. In the 1970s and 1980s, there were a number of aid-funded projects directed at promoting commercial cattle production; however, these proved unsustainable. The Asian Development Bank (ADB 1996) concluded that 'cattle raising was not suitable to the social, cultural and economic conditions of the villages'. This explanation seems simplistic, given the quite contrary experience of Vanuatu's small farmer cattle producers.

Without progress in the diversification of its smallholder agriculture, SI remains highly vulnerable to the vagaries of international commodity markets. Past efforts have shown that successful diversification remains a complex and elusive goal to achieve. Given the constraints faced, the country is fortunate that it maintains a strong subsistence and tree-crop commodity base.

2 Coconuts

2.1 INTRODUCTION

Coconuts are of fundamental importance to the Solomon Islands (SI) economy. They are an important food item and are exported as whole nuts, copra, coconut oil manufactured from copra, or oil extracted directly from coconuts. Coconuts provide a meagre cash income for rural households scattered throughout the country that have few other sources of income.

With adequate drainage, coconuts produce well on a wide range of soils. The coastal areas of SI have a suitable climate for coconut production, with high year-round temperatures and humidity. Coconuts tolerate neglect perhaps better than any other crop, although they do so at a much diminished level of performance. Copra is relatively nonperishable and thus is more resistant to infrequent and unreliable transportation infrastructure than are other crops.

Table 2.1 shows the distribution of copra production and income by province. In 1998 and 1999, an average of $18 million per year was distributed to approximately 57 000 rural households throughout the country as a result of copra sales.

Coconuts not only provide a cash income, but also make an important contribution to subsistence. Jones et al (1988) reported a survey conducted in the 1980s that found that the population consumed an average of 0.7 coconuts per person per day. There is no reason to believe that the consumption rate of coconuts has changed. Thus, with SI having a current population of approximately 420 000 people, it is estimated that 107 million coconuts are consumed annually. This equates to around 20 000 tonnes of copra (approximately 5200 nuts are required to produce a tonne of copra), which is about the current level of copra production.

During 2004, there was a significant increase in the domestic price for coconut products because of increasing copra prices. Table 2.2 shows the main domestic markets and prices for various coconut products in November 2004.

2.2 RECENT INDUSTRY EXPERIENCE

The SI copra industry has not suffered the steep decline of other Pacific Island country (PIC) industries, except during the period 1999–2002. This can be explained by SI having an underlying comparative advantage in copra production. In the medium term, the industry has a good sustainable future. However, there has been virtually no replanting of coconuts over the past two decades, and many palms are now entering the long phase of declining production. Without any systematic replanting, the long-term future of a commercial coconut industry is threatened.

In the past 15 years or so, the SI copra industry has gone through a period of upheaval as it has moved from parastatal monopoly marketing arrangements to deregulated private-sector marketing.

Table 2.1 Distribution of copra production and income by province (average 1998–99)

	PRODUCE		HOUSEHOLDS		TOTAL INCOME		
Province	Amount (tonnes)	Share of national total (%)	No.	Share of national total (%)	Amount (SI$)	Share of national total (%)	Income per household (SI$)
Choiseul	2 524	10.1	3 142	5.5	1 787 798	10.0	569
Western	6 004	24.1	9992	17.4	5 325 736	29.8	533
Malaita	5 004	20.1	18347	32.0	3 559 318	19.9	194
Makira	2 707	10.9	4926	8.6	1 704 396	9.6	346
Temotu	1 745	7.0	3415	5.9	1 154 270	6.5	338
Isabel	2 129	8.5	3556	6.2	1 454 404	8.1	409
Central	1 370	5.5	3625	6.3	873 625	4.9	241
Guadalcanal	3 456	13.9	10399	18.1	1 986 209	11.1	191
Total	24 939		57 402		$17 845 756		

Source: CEMA and the 1999 census

Table 2.2 Domestic prices for coconut products, November 2004

PRODUCT	DOMESTIC MARKET	PRICE
Copra	Export buying centres (Honiara and Noro)	$1.30–$1.50/kg
	Provincial buying centres (rural traders)	$0.80–$1.10/kg
Coconut oil	Copra oil purchased by local manufactures (Solomon soap)	$2.50–$3.40/litre
	Virgin coconut oil sold to Kokonut Pacific	$8/litre
Whole nuts	Dry nuts (Honiara market)	$0.50–$1.00/nut
	Drinking nuts	$1/nut wholesale $2/nut retail

Source: CEMA

2.2.1 COMMODITIES EXPORT MARKETING AUTHORITY

In the 1990s, the Commodities Export Marketing Authority (CEMA) embarked on an ambitious plan to process copra into coconut oil to increase the value added to the industry. It used European Union (EU) commodity stabilisation funds (STABEX) to establish copra-crushing mills in six provinces. In most cases, these were joint venture investments with the provincial governments. CEMA set up a crushing mill at Tenaru on Guadalcanal, but this was destroyed in 2002.

In the mid-1990s, the government took over Levers Plantation Limited (LPL) under a new company entity called Russell Islands Plantation Limited (RIPEL), and CEMA became a major shareholder in the new company. In 1998, CEMA refitted the former Levers crushing mill at Yandina in the Russell Islands and began to rehabilitate the large Levers plantation using the cash flow from the reasonably buoyant coconut oil and copra prices that prevailed at the time.

By the late 1990s, there were eight crushing mills operated directly or indirectly by CEMA. CEMA was the sole buyer of copra from producers and supplied all this copra to the crushing mills. About 80% of the total copra that was manufactured into oil was supplied to RIPEL, with the balance shared between the other seven mills. The smaller crushing mills sold their oil to RIPEL, which was the sole exporter. Thus the seeds were sown for the subsequent collapse of the copra industry.

In 1999, RIPEL and CEMA began to encounter serious cash flow problems. This was the result of a combination of factors. First, copra prices fell sharply in 1999. Second, the government instructed

CEMA to pay growers prices well in excess of market value for copra ($1000/tonne instead of $500/tonne), exhausting CEMA reserve funds. Third, CEMA lost money from its investment in three vessels that were intended to be used for the collection of copra, but were unsuitable for the purpose. Fourth, CEMA's investment in RIPEL was proving to be an unproductive asset. In particular, RIPEL's own copra and cocoa production was substantially curtailed by a major industrial dispute with its work force of 1200 people. This dispute has yet to be resolved. Fifth, when RIPEL was unable to negotiate export freight contractual arrangements, the company was sold at a price well below the value of CEMA's investment. Sixth, the 1999–2002 political crisis affected the flow of copra, first from Guadalcanal and Malaita and then from other areas. Finally, an injection of working capital ($5 million) approved by cabinet in February 2001 was never transferred to CEMA.

By 2001, RIPEL was no longer paying CEMA for copra supplied. As a result, CEMA ran out of cash to purchase copra, and the industry collapsed, with production falling below 2000 tonnes in 2001 and 2002. In each of those years, nearly $20 million was withdrawn from the rural economy, which helped to fuel the crisis that subsequently engulfed the country.

2.2.2 DEREGULATION

In 2002, the government removed the CEMA monopoly, deregulating the marketing of copra. Production recovered to 22 100 tonnes of copra in 2004 (see Chapter 1, Table 1.3).

Deregulation saw the immediate entry of 13 licensed exporters and numerous buyers and agents in the provinces. They were mainly involved in the export of copra, but some small-scale milling has recommenced. The industry has shown remarkable resilience in the face of adversity. Its recovery can be attributed to six main factors: a fundamental comparative advantage in copra production; the desperation of many rural households for a source of cash income; the ability of coconuts to survive several years of complete neglect; a period of relatively favourable copra prices; the existence of a network of collection centres, previously established by CEMA, which could be used by private marketers; and the availability and willingness of the private sector to become involved in copra trading.

Since deregulation, there has been an ongoing adjustment process in copra marketing. Initially, there were 32 applications for export licences, of which 13 were approved. Following attrition and mergers, only three are now regarded as active. This is hardly surprising, given the nature of copra and its marketing. Unlike coffee, and to some extent cocoa, copra is a homogeneous product, sold to few buyers worldwide. Substantial economies of scale accrue to marketing. Despite the management failings of CEMA, there were good economic and social reasons for creating a monopoly marketing body for copra. In particular, many copra growers lived in isolated locations that needed to be serviced, and the cost of this could be cross-subsidised from the earnings of better located buyers. In 2000, a study of agricultural marketing in the Pacific Islands region undertaken by the Food and Agriculture Organization of the United Nations (FAO) noted:

In the Solomon Islands CEMA took the bold step of directly addressing the problem of access to remote regions. Since 1995, 46 'buying points' together with 54 shipping 'points of call' were established. To make the buying points system work CEMA had to also provide the shipping. Three ships were chartered on a full time basis and a further 11 vessels are hired on a freight basis. These vessels call at each buying point on a 4 to 6 week basis. The ships also supply farm inputs to the buying points. The grower response to the system has been quite spectacular with a 20% increase in copra purchases occurring in 1997. The provision of this service has been at considerable financial cost — around SI$3 million annually. The growers have had to incur these costs in lower prices — this has been relatively easy to absorb in the relatively buoyant copra market at the time. It is the view of CEMA's General Manager, that within reasonable limits growers are much more concerned with frequency of market access than they are with price. CEMA, prior to the current political crisis, was considering the option of acquiring and operating its own vessels to support their buying point network. The cost and management implications of such a step need to be analysed very closely. A move intended to reduce costs could quite easily lead to an escalation in costs (McGregor 2000).

Most small exporters who entered the industry faced difficulties in financing copra buying and in coordinating shipping. There continues to be an increasing concentration of copra marketing arrangements, including the recent decision of Western Coconut Products (jointly owned by CEMA and the Western Province Government) to lease its entire Western Province operation to Holland Commodities. Over the next few years, the number of copra exporters can be expected to dwindle to one or two larger businesses, which will be better placed to provide working capital to their buying agents and to coordinate available shipping. Despite privatisation, the industry structure is likely to be similar to that which existed under CEMA. The private sector can now use CEMA's public investment in marketing infrastructure. Under these new arrangements, buying agents serving more isolated locations have special needs for working capital. These isolated areas include the Shortlands, north and southeast New Georgia, the north coast of Malaita and the Guadalcanal Weather Coast.

2.2.3 VALUE ADDING

Another feature of the recent revival of the coconut industry has been the emergence of value-added oil producers. Two types of mini-mills producing virgin coconut oil have been established: direct micro-expelling of oil from coconuts, bypassing the conventional copra making stage; and cold pressing oil from copra. Unlike copra and conventional copra oil, these oils are niche products that enter quite different marketing chains. These developments are analysed in detail below.

2.3 COPRA AND CONVENTIONAL COCONUT OIL

2.3.1 NATURE OF THE MARKET

Coconut oil and palm kernel oil have similar properties and belong to a category of oils known as the lauric oils.[1] Their high lauric acid content has particular advantages for food and industrial uses. Over the past 25 years, lauric oils have received an average price premium approximately 15% higher than other vegetable oils. This privileged position is now under threat with the emergence of genetically modified rapeseed (canola) oil. More constant demand, combined with greater production instability, explains the greater price instability of the lauric oils compared with other oils.

The lauric oil market (copra, coconut oil, and palm kernel oil) is highly competitive. The market is characterised by little product differentiation and limited opportunities for niche marketing. However, cold press virgin coconut oil is becoming an increasingly important exception.

The world copra market is normally narrow, with marketing undertaken by a few companies worldwide. These companies sell the copra to the crushing industry for processing to oil and cake. All copra and crude coconut oil, regardless of where it is milled, receives the price set by the Federation of Oils, Seeds and Fats Association (FOSFA), with discounts for poorer quality applying. There has, however, been a structural change in the copra market in recent years, with copra crushers in Bangladesh buying directly from exporting countries, including SI. Millers in Fiji, Vanuatu and Samoa are now following this trend.

The demand for copra is derived from the demand for coconut oil. Prices of the two products track each other closely, although differences have lessened in more recent decades, reducing the value added from producing coconut oil domestically.

World copra and copra oil prices have significantly increased over the past 12 months. The average price of Philippines copra (fob Manila) in September 2004 was US$375/tonne; 40% higher than the price for September 2003 (APCC 2004). The average price for coconut oil in Europe (cif Rotterdam) in September 2004 was US$660/tonne; this was an increase of US$225/tonne (a 51% increase) from the same period in 2003. Resurgence in copra and oil prices has been due to three main factors.

First, there has been an increase in world soybean prices. The 15 March 2004 issue of the Public Ledger reported 'that fears were beginning to mount

1 Between 1977 and 2002, there was a 0.99 correlation between coconut oil and palm kernel oil (McGregor 2003)

that the United States (US) would have to resort to the importation of soybean in response to shortages in domestic supply'. This had a knock-on effect on all edible oil prices, including coconut and palm oil. Second, expectations of a renewed El Nino episode have pushed up oil palm futures, including for palm kernel oil, which is coconut oil's closest substitute. The 16 August 2004 issue of the Public Ledger reported that parts of Malaysia and Indonesia were expected to receive as little as 10% of their usual rainfall over the next three months (Agra Informa 2004). Palm oil production in Malaysia, the world's largest producer, fell to a five-year low in 1998 after a decline in rainfall the previous year, caused by the El Nino weather pattern. Third, some events in the Philippines have affected the copra and copra oil markets. These include increased demand for coconut timber, which encouraged the felling of old palms during the previous low-price period (*Philippines Daily Inquirer,* 24 October 2004). In addition, some copra oil has been diverted for use as biofuel.

2.3.2 MARKET PROSPECTS

Compared with many other major commodities, the market prospects for edible oils as a group are reasonably good. This is a result of their high income elasticity in the major growth markets of China and India. However, the realisation of their market potential depends on the continuation of the trade liberalisation reforms of the Uruguay Round. In this respect, the 2002 US Farm Bill represents a major setback (McGregor 2003).

Coconut oil specifically faces the highly competitive and consistently increasing production of oil palm, soybean and rapeseed. Copra yields are comparatively low, even when higher-yielding hybrids are planted. A well-managed copra plantation might be able to produce the equivalent of 1.7 tonnes of oil per hectare per year. Solomon Island smallholders were producing 0.9 tonnes of copra (around 0.4 tonnes of oil) per hectare (Anon 1986). In comparison, oil palm plantations in Malaysia and Indonesia produce 7.5 tonnes/hectare, together with 1.5 tonnes of kernels (Corely 2003). The development of genetically modified rapeseed (canola) is seen as a particular threat. This is a close substitute for coconut oil, and can be produced at a significantly lower cost. India and China, the two powerhouses in the expansion of world demand for oils, are only minor importers of coconut oil. The US remains a minor importer of coconut oil for edible purposes; this is the legacy of the sustained campaign in the 1980s against 'tropical fats' by soybean interests. The elimination of the tariff differentials between copra and coconut oil is likely to further reduce the available export market for copra in the longer term.

In a recent address to regional coconut industries, a Commonwealth Scientific and Industrial Research Organisation (CSIRO) researcher summed up the market environment facing copra and copra oil as follows:

Except for its persistence as a favoured deep-frying oil coconut fell to a minor position in the food market and became reliant on the steady but low-priced market for lauric oils by manufactures of detergents and soap. In spite of the entry of palm kernel and transgenic canola into that market coconut oil has held its own but at a price that discourages many traditional producers from participating. (Foale 2004)

For the medium term (at least for the next five years or so), the interest of other PIC copra oil producers in importing copra is a positive development for SI. In 2004 (to September), nearly 1400 tonnes of copra were shipped from SI to Vanuatu's Santo mill. Fiji's Savusavu-based mill has expressed an interest in importing 1000 tonnes of copra a month (John Teiwa, CEO, Coconut Industry Development Authority, pers comm, September 2004). 'Southward' shipments are now more feasible than they were several years ago, with the emergence of charter-based shipping arrangements between PICs. One such charter company is the Kiribati-based WKK shipping company, which is offering charter rates of around A$1000 per day and turnaround times of about 10 days to other PIC destinations (John Teiwa, CEO, Coconut Industry Development Authority, pers comm, September 2004). This is more economical than shipping copra to Bangladesh or Europe.

The increasing interest of PIC millers in SI copra is a reflection of supply problems facing their own industries rather than of growing international demand for copra oil. Thus, these markets probably

do not provide a long-term basis for the SI industry. However, they help to provide breathing space for the industry while the necessary adjustments can be made.

2.4 VALUE-ADDED PRODUCTS

Some value-added coconut products offer greater returns than can be achieved by coconut oil or copra. They include virgin coconut oil, coconut cream, coconut timber, high-quality soap, coconut oil as a diesel substitute, activated carbon and cocopeat. Fiji and Samoa led the way in taking advantage of these opportunities, which are likely to be the new face of the future Pacific Island coconut industries. In varying degrees, some of these products are appropriate for a diversified SI coconut industry.

Below the study team describes the main oil production methods and their current role in SI and other PICs. The team then considers briefly the market opportunities and appropriateness of value-added products for the current SI coconut industry. The financial analysis is divided broadly into export and domestic market products.

2.4.1 VIRGIN COCONUT OIL

Coconut oil that is produced from copra is usually pressed at high temperatures using an expeller. This expeller oil (crude coconut oil) requires expensive chemical-based refining, bleaching and deodorising before it can be used as an edible oil. Virgin coconut oil is distinctly different from oil pressed from copra at high temperatures using an expeller. Crude coconut oil attracts the lowest price (with further discounts applying for poor quality); conversely, virgin coconut oil commands a price premium.

Foale (2004) has described four ways to produce virgin coconut oil: the direct micro-expelling method; the cold press method; hot oil immersion drying; and the 'fermentation and gentle heating' method. The main characteristics of these processes are described below, and the operations of direct micro-expellers (DMEs) and small cold press copra mills are evaluated in terms of the Pacific Islands experience and in the context of SI.

Direct micro-expeller method

The DME method takes advantage of the enhanced release of oil at a moisture content of around 11%. The process bypasses the conventional copra-making stage of oil production. Whole coconuts are split and the raw kernel is shredded by a rotating 'pineapple-head' shredder (usually powered by a generator). The shredded meat is dried on a stainless steel plate under a moderate heat for about 20 minutes. A hand-operated cylinder press is then used to extract the oil. Up to 90% of the oil can be extracted using this method. It takes about one hour to complete a 'batch' from whole nut to oil.

There are now 11 DME units operating in SI (five on Malaita, five on Makira and one on Guadalcanal) under the auspices of Kokonut Pacific (Solomon Islands) Ltd, a subsidiary of the Australian-based Kokonut Pacific. DME operations have been established in most coconut-producing PICs.

DMEs can produce an outstanding product that is in high demand if they are operated to specification to obtain the critical moisture content at the time of extraction. Foale (2004) says:

This oil which has not been subject to temperature much in excess of 60 deg C at any stage in the process, has outstanding qualities of aroma and clarity after suitable settling time is allowed. This oil is remarkably stable and appears to have an indefinite shelf life at ambient temperature. An important feature of the process is the extremely short interval (generally less than 1 hour) between the cracking open of the nuts and the completion of the oil extraction. The opportunity for any sort of degradation of the product in the DME process is extremely low. The tested free fatty acid (ffa) content of the oil is testimony to that.

Financial models show that the operation of DMEs is viable at prevailing prices if they are operated regularly with a high level of throughput. This viability is significantly enhanced if there is a modest increase in ex-factory prices. Such a price increase is a reasonable expectation as markets are developed and the advantages of organic certification are realised.

Over the past decade, there has been a proliferation of small DME operations throughout the Pacific Islands — notably in Samoa, Fiji, Kiribati and, more recently, SI. DMEs have been particularly favoured by various sustainable livelihood programs of the United Nations Development Programme (UNDP).[2] The equipment has usually been provided as a grant to the community concerned. Given the apparent appropriateness of the technology and strong market demand for the product, the general performance of DMEs has been disappointing (UNDP 2001). For example, in Samoa, the nongovernment organisation (NGO) Women in Business (WIB) administers a network of organically certified DMEs. Of the original 23 DMEs established, only four are now producing regular amounts of oil — 100–200 litres per week (Government of Samoa 2004). In Fiji, where a dozen DMEs were established under a variety of UNDP programs, none of the original groups is operating commercially. However, a number of private, individual operations continue to operate successfully in Fiji.

There are several reasons for this disappointing performance:

- Many DMEs were established as community operations. This was the result of the naïve assumption of many donors that village enterprises should be community based. The reality is that when it comes to income-earning activities, rural households can be individualistic in their approach.
- Interested individual households and enterprises have faced barriers to establishing DME businesses. This has been due to the relatively high capital cost of the equipment, the absence of rural finance, and the unwillingness of donors to assist individually owned enterprises.
- Many DMEs have not been able meet the quality specifications of the market, particularly with respect to critical moisture requirements. The Samoa Coconut Industry Review notes that the 'drying and pressing process is labour intensive and requires the driers to be continuously monitored, which does not suit many villagers' (Government of Samoa 2004).
- DMEs have tended to operate in isolation, with weak marketing links and little backup. A review of the UNDP's Small Enterprise Development (SED) Programme, which funded a number of DMEs, concluded 'that most of the SED enterprise activities (eg paper and soap making, non traditional craft making and micro coconut oil expellers) did not have strong marketing links and were not able to sustain the hard times after May 19 2000' (UNDP 2001).
- Difficulties in obtaining and maintaining organic certification has been a problem for some DME operations. Organic certification is becoming essential for successful export marketing, to obtain the premium prices required for financial viability. People who have not been able to acquire certification have been at a considerable disadvantage. The overhead cost of organic certification is high and the requirements are administratively demanding. The Samoan Coconut Industry Review notes 'the high cost of certification has limited the adoption and growth of the venture by villages. Certification requires considerable record keeping and at present, WIB is providing this service for the villages, as well as providing training, registration and mapping of farms etc but they recognise this situation cannot go on forever' (UNDP 2001).

In response to some of these problems, the Samoan virgin oil industry is looking to move away from village pressing by establishing a centralised pressing mill that will purchase coconuts from certified growers. This is seen as necessary to achieve the level and consistency of supply, the quality control, and the extension and marketing support to be able to compete on international markets at any significant scale (Government of Samoa 2004). In Papua New Guinea (PNG), a successful DME operation on Karkar Island is seeking outside investment to expand its boutique cold facility into a commercial-scale operation (ADB 2004).

2 See http://www.undp.org/hdro/solomon.htm

Much can be learned from the experience of other PIC coconut industries. However, the prospects of DMEs need to be evaluated in the context of the SI environment. Some positive indicators for success compared with Fiji and Samoa include the following:

- The alternative income-earning opportunities for rural people in SI are considerably less than they are in Fiji and Samoa. This explains why people in SI are much more willing to cut copra than their counterparts in Fiji and Samoa are. Thus, if the return to labour from producing virgin coconut oil is at least comparable to that of cutting copra, people will be interested. The financial models constructed below show that the financial returns in SI are currently comparable to those from producing copra.
- Kokonut Pacific, through its subsidiary Kokonut Pacific (Solomon Islands) Ltd (KPSI), has decided to establish operations in SI but has not done so in other PICs. KPSI is in a position to provide direct marketing and technical support.
- The output performance of the SI DMEs since their start-up at the end of May 2004 has been excellent. According to the October newsletter of KPSI, their operating units had an average daily throughput of 36.8 litres of oil over a three-month period. If the units operate for six days a week, this represents around 220 litres of oil a week. The four best operating Samoan units are achieving only 100–200 litres of oil per week. In addition, SI quality control appears good. When the October newsletter was published, 10 800 litres of oil had been exported, with only 600 litres rejected as not being of exportable grade (about 6%). The initial start-up group is well known by KPSI and was carefully selected, with training provided. This, no doubt, has contributed to the excellent start-up performance. The financial analysis below shows that high throughput rates are necessary to achieve financial viability.

The encouraging start-up suggests that significant DME expansion might be feasible. However, it is unlikely that virgin oil produced from DMEs could account for much more than about 5% of SI copra (around 750 000 litres of oil), given the need to achieve high throughput rates to achieve financial viability, and the logistical and quality control constraints.

Cold pressing copra

A worthwhile innovation in the PIC coconut industries has been the introduction of Indian Tinytech cold press mills. If good-quality copra is used, then the oil quality is equivalent to that achieved with a DME. Tropical Products operates this system at Ranadi, buying in copra. Smaller units are operated at Choiseul Bay and at Taalu on Malaita. The Malaita operation supplies Tropical Products with oil. There are two successful cold press copra oil operations in Fiji.

The capital cost of Tinytech cold press mills is low (around SI$60 000 landed in Honiara, including a generator) and throughput is reasonably high (the mills are capable of handling around 600 kg of copra in a day). The oil extraction rate is lower than that of a conventional copra mill when the cold press option is adopted (around 52% oil). In Fiji, if high-quality copra is used, the quality of the oil expelled is equivalent to that derived from a DME. The Tinytech mills operating in Honiara and Malaita have suffered because of the quality of the copra used. They have received considerably lower prices for oil than their DME counterparts.

The Tinytech mills use far less labour than DMEs (three people are required to produce around 300 litres of oil compared with six people to produce 45 litres). This enhances financial viability but reduces the economic value added. As with DMEs, financial viability depends on achieving a reasonably high throughput. The challenge for the Tinytech operations is to improve the quality of copra so they can receive a significantly higher price for their oil.

Hot oil immersion drying

This Southeast Asian method of oil extraction involves the use of a bath of hot coconut oil to dry fresh coconut kernel. After drainage, the oil from the kernel is pressed. The method is not used in SI or in other PICs.

'Fermentation and gentle heat' method

In the 'fermentation and gentle heat' method, coconut cream is extracted from coconut meat by grating and squeezing. The coconut cream is then allowed stand for 24–48 hours at ambient temperature to separate the water from the emulsion. The concentrated emulsion is heated gently to drive off any remaining water. The oil produced by this method is far superior to that from the traditional village method of boiling coconut cream. The method is yet to be adopted commercially in SI or, to the author's knowledge, in any other PIC.

Export markets for virgin coconut oil

The term 'virgin' was coined as a marketing tool in the olive oil industry, where it is taken to mean the first pressing of the fruit (Foale 2004). 'Extra virgin' has been used by the olive oil industry to describe oil that has been pressed the same day that it has been picked, which further differentiates the product in terms of pricing and quality. Through the persistent marketing tactics of the olive oil industry, these terms have been used to extract significant market premiums. They have an established connotation of quality and have been cleverly borrowed by speciality coconut oil marketers of cold press oil.

Virgin coconut commands a significant price premium. Foale (2004) reports that an fob price of US$3–4 per litre of oil is not uncommon for good-quality virgin coconut oil. At the beginning of October 2004, Philippines crude coconut oil was fetching a cif price of US$660/tonne in European ports. Care must be taken in comparing the price of a bulk commodity (crude coconut oil) with the current price of a niche product (virgin coconut oil). If substantial quantities of virgin coconut oil were produced, the price differential would be expected to narrow significantly. However, indications given by a number of different producers of virgin coconut oil suggest that the market is considerably undersupplied and likely to be so for the foreseeable future.[3] A review of the Samoan coconut industry in April 2004 concluded that:

The Pure Coconut Oil Company have been overwhelmed with interest from other markets and price for virgin oil have remained steady, even whilst the price of copra oil plummeted. However, the future is less certain as more overseas producers gear up production, especially in the lower cost Philippines. A possible offsetting factor may be the recent medical reports promoting the health benefits of virgin coconut oil (Government of Samoa 2004).

Virgin coconut oil has three identified market segments. First, it can be used directly in a medical context.[4] Second, it can be processed into high-quality soaps, shampoos and body lotions. Third, it can be used in cooking — for deep frying, for shortening and in cake and biscuit baking. Coconut oil is now being recognised as having a very favourable cholesterol profile, despite a previous misinformation campaign run by soybean interests. The virgin coconut industry is at the forefront of the campaign to rehabilitate the image of the coconut in the diet of the nontropical world. Foale (2004) notes:

Competing dietary oils have been shown to have many pitfalls, typified by the trans fatty acid story, which get worse as time passes. Trans is known to a role [sic] in many degenerate diseases and is associated with the increased incidence of cancer. All unsaturated oils, mono and poly are prone to generate trans under the hydrogenation process that is used to manufacture margarine and shortening. Coconut has so little unsaturated components that it stands apart in this regard. This is but one example of the anomaly that those flawed competitors have all but extinguished the place of the coconut in the diet of the non-tropical world [sic].

Virgin coconut oil products are often organically certified, giving them additional appeal to the type of consumer they attract. Organic products are defined as those grown and processed in a sustainable manner without artificial chemicals. On these criteria, virgin coconut oil is in direct contrast to conventionally processed edible coconut oil, which is processed using chemical solvents. Organic certification offers price premiums, but perhaps

3 These producers include John Riches, Fiji Natural Oils, Suva, Fiji; Adrian Tarte, Vuna Taveui, Taveuni, Fiji; Gaetane Austine, Reniu product line, Sandollas Ltd, Fiji; Mokosoi Products (Fiji) Ltd, Lot 24, Wailada Estate, Lami, Fiji; Pure Coconut Oil Company, Samoa; Kokonut Pacific (Solomon Islands) Ltd; John Volraith Tropical Products, Solomon Islands; and Middleton Plantations, Karkar Island, PNG.

4 Lauric fatty acid in coconut oil is said to be antiviral and is said to be able to beneficially reduce the viral load of HIV patients.

more importantly it offers access to a wider range of markets. For small virgin oil producers, organic certification is starting to become a marketing tool of necessity rather than choice. Some producers are also taking on 'alternative or fair trade' certification, which further expands their market access and attraction. The internet is becoming an increasingly important marketing tool for small virgin oil producers and has enabled them to further differentiate their product and reduce their marketing costs.

2.4.2 COCONUT CREAM

In the late 1980s, Samoa pioneered the development of canned coconut cream. The target markets were the large expatriate Samoan communities in New Zealand, Australia and the US. However, following two devastating cyclones in the early 1990s, Samoa was forced to withdraw from the market that it had developed. This provided the opportunity for Indonesia to assume market dominance, which it still retains.[5] Inadequate international labelling laws have made it difficult for the superior-quality Samoan product to compete with the adulterated, lower-priced product from Asia. The Samoan process for manufacturing coconut cream involves removing the brown testa covering the meat before squeezing out the milk. This means that Samoan coconut cream has a natural, bright white colour. However, it is a labour-intensive process that other manufacturers do not follow, preferring to obtain the required colour through the addition of chemical colouring agents.

It would be difficult for SI, as a new entrant, to compete with Samoa at the top end of the market or with Indonesia at the much larger lower end of the market. To compete, a would-be investor would probably need to invest in an aseptic plant rather than relying on expensive and old-fashioned cans. The key issue will be to attract such an investor.

2.4.3 COCONUT TIMBER

There is a growing market for senile coconut palms for timber, particularly for manufacturing high-quality furniture. A Fiji-based company, Pacific Green (PG), has led the development of high-value upmarket furniture. Over the period 1997–2000, some 93 000 senile trees were logged at a farm value of about F$200 000 (Canadian International Development Agency (CIDA) Annual Report 2001). The manufacture of high-value furniture requires quite sophisticated methods, for which PG holds a number of patents. PG now plans to shift its furniture-making operation from Fiji to China. Hence, it is highly unlikely that the company would be interested in setting up operations in SI. However, PG has expressed interest in sourcing coconut timber slabs from Fiji and other PICs (John Teiwa, CEO Fiji Coconut Industry Development Authority, pers comm, September 2004).

2.4.4 HIGH-VALUE SOAPS

SI has a long tradition of producing soaps for the domestic market. Solomon Soaps Ltd remains a major manufacturer and accounts for a significant percentage of the local soap market. With the availability of high-quality coconut oil (either DME or cold press copra) there is the opportunity for SI to enter the high-value boutique market for premium-quality soap. Two Fijian companies, Mokosoi Soaps and Sandollars, illustrate the potential of this market. It is encouraging that both KPSI and Tropical Products Ltd are experimenting in this area.

2.4.5 COCOPEAT

Cocopeat is made from the fibres of coconut husks and is used as a soil replacement medium, mainly in the nursery and floriculture industries. The husks are chopped into a fine powder and then packed into bricks and bales for export.

2.5 DOMESTIC MARKETS FOR COCONUT PRODUCTS

The analysis below shows that it is conceivable that SI could have a substantial, and even expanded, coconut industry that supplies only the domestic market.

5 In 2000, total world exports of coconut cream were 15 264 tonnes, of which Indonesia accounted for 9234 tonnes (60%) (APCC 2001). Samoa's exports in 2000 were 1481 tonnes (10%).

2.5.1 COCONUTS AS FOOD

Coconuts make up a basic component of the SI diet, in the form of coconut cream and milk for cooking and immature nuts for drinking. It is estimated that the copra equivalent of coconuts consumed as food is around 20 000 tonnes (see Section 2.1).

2.5.2 EDIBLE OIL IMPORT SUBSTITUTION

Part of the domestic consumption of nuts is as cooking oil, mostly at the village level. However, considerable volumes of edible oil are imported into SI. The average volume imported in 2001–03 was 891 500 litres of oil per year, valued at $1.49 million (see Table 2.3). It is thought that imports were considerable higher in 1998 and 1999, though no data are available for those years. It would be reasonable to expect that, with the upturn in the SI economy, edible oil imports could approach two million litres, with a value of around $5–6 million. Much of this imported oil could be replaced with virgin coconut oil. A million litres of oil would be equivalent to the output of over 80 DMEs, or 20 Tinytech copra mills, operating at near full capacity. The quantity of virgin coconut oil being sold at the Honiara market indicates that this import substitution seems to be well under way.

The low value of the SI dollar and high import duties and taxes on import oils offers a high level of protection for import substitution virgin coconut oil.[6] However, support for a promotional campaign to encourage the use of locally produced virgin coconut oil in cooking could be a worthwhile initiative.

2.5.3 BIOFUEL

Coconut oil has long been recognised as a substitute for diesel fuel. Alone or as a blend, 'biofuel' can substitute for distillate for power generation and transport. Tropical Products is successfully using coconut oil mixed with simple additives to run several diesel engines. In Honiara, the current price of diesel is $4.11/litre. Outside Honiara, diesel costs $5/litre to $8/litre (assuming it is available at all).

Thus coconut oil — available from a Tinytech mill for less than $4/litre — is seen as a highly viable option, particularly in more remote locations.

Table 2.4 shows SI fuel imports between 1990 and 2002. Over that period, annual distillate imports were around 52 million litres. At current production levels, there would not be enough coconuts to replace more than half the country's distillate requirements.

The Solomon Islands Electricity Authority (SIEA), with financial support from the Australian Agency for International Development (AusAID) and New Zealand's International Aid and Development Agency (NZAID), tested pure coconut oil in an old 80 kilovolt ampere high-speed Perkins diesel engine at its Lata power station in Temotu Province in 2002 and 2003. The 2004 *South Pacific Regional Energy Report* (McGregor et al 2004) notes:

By early 2004, SIEA had not yet formally reported results. However, SIEA reports two test runs. During the first, the fuel flow rate was problematic due to insufficient pre-heating. During the second run, conducted over a two-week period in October–November 2003, problems were experienced with clogging filters, which led to engine shutdown every 4–5 hours. Testing was stopped when SIEA ran out of filters but SIEA feels that the problems were not serious and can be overcome. They remain interested in coconut oil as a fuel for remote sites, noting that coconut oil at Lata cost SI$2.5 per litre compared to SI$4.0 for diesel fuel.

It is recommended that continued technical and financial support be provided for the development of biofuel in SI.

2.6 INDUSTRY EFFICIENCY AND VIABILITY

Farm budget analysis shows that, in terms of returns to labour, copra is a financially viable enterprise for small farmers in SI, provided there is an operating marketing system in place (see Table 2.5). This financial viability even extends to the replanting of coconuts, provided farmers are provided with steel pipes (flues[7]) for drying. Comparative advantage

6 Imported edible oils are subject to a 20% import duty on the cif value. In addition, they are subject to a 15% sales tax, imposed on the dutiable value multiplied by a factor of 1.3.

7 These are steel pipes (3" gauge, 3' diameter, and 8' or 13' length) in which fuel is burned to dry copra. If the drier is used regularly, the steel flue can last many years. The standard practice in the copra industry is to use second-hand 44 gallon fuel drums in its copra driers. Because of their thin gauge, these drums quickly burn out, leading to smoke contamination of the copra. The 44 gallon drum driers are very inefficient and wasteful in the use of firewood.

Table 2.3 Edible oil imports, 2001–03

	2001		2002		2003	
SITC code	Volume (L)	Value ($)	Volume (L)	Value ($)	Volume (L)	Value ($)
15079000 (soya bean)	2 340	4 010	6 992	27 066	52	4 369
15090000 (olive oil)	490	8 883	1 698	18 641	1 335	29 078
15100000 (other oils)	21	2 290	4 060	45 420	19	3 229
15119000 (sunflower and saffron)	163 325	349 602	170 867	496 316	115 227	385 614
15121900 (sesame)	65	1 125	0	0	36	382
15155000 (fix vegetable oil)	292	2 591	174	8 249	146	5 184
15159000 (vegetable fats and oils)	1 465 971	2 700 961	395 637	1 247 535	229 068	842 447
15162000 (other vegetable fats and oils)	1 619	13 228	34 515	111 549	77 606	223 245
Total	**1 634 123**	**3 082 690**	**613 943**	**1 954 776**	**423 489**	**1 493 548**

Source: Data supplied by the Solomon Islands Ministry of Trade and Commerce

Table 2.4 Fuel imports to Solomon Islands, 1990–2002 ('000 litres)

FUEL	1990	1991	1992	1993	1994	1995	1996	1997	1998	2001	2002
Aviation gasoline	486	610	2 237	887	841	2 082	884	578	224	211	483
Jet fuel	846	1 443	1 579	1 742	1025	1 452	2 881	3 059	2 465	4 190	3 972
Kerosene	1 586	2 723	2 213	2 877	2 825	2 883	2 751	3 442	2 481	3 397	3 315
Distillate fuel	**49 780**	**48 385**	**51 287**	**47 646**	**46 545**	**48 142**	**54 730**	**51 995**	**62 435**	**55 974**	**47 696**
Lubricating oil	1 291	1 093	1 425	1 736	1 609	1 465	953	952	1 025	1 006	1 021
LP gas	82	504	583	783	533	665	803	898	945	1 079	870
Total ('000 litres)	**66 286**	**67 016**	**71 300**	**67 645**	**68 181**	**73 750**	**84 155**	**76 723**	**84 644**	**86 257**	**72 156**
Value ($ million)	**30.16**	**43.90**	**40.096**	**40.36**	**38.01**	**44.30**	**56.32**	**53.87**	**67.05**	**91.49**	**89.93**

Note: Data are not available for 1999 and 2000

Source: Solomon Islands Statistics Office 2003. See http://www.spc.int/prism/country/sb/stats

analysis undertaken in 1997 also showed that planting coconuts for copra is economically viable for the SI economy. McGregor (1998) estimated the domestic resource cost (DRC) ratio for smallholder copra production in SI to be 0.18.[8] These results indicate that smallholder copra is an efficient foreign exchange earner. The low DRC ratios were in large part due to the weak SI currency, but the efficiency or competitiveness would not disappear even if there were significant appreciation of the SI dollar. These results provide a strong economic justification for the rehabilitation of the SI copra industry. In contrast, the same study showed that Fiji did not appear to have a competitive advantage

8 The DRC compares the domestic cost of the resources (land, labour and capital) used by a particular industry with the foreign exchange generated or saved by that industry. A DRC of less than one means that less domestic currency is required to generate an equivalent unit of foreign exchange. That is, the SI dollar value of resources used is less than the SI dollar value of foreign exchange generated or saved. Such an industry is an efficient generator or saver of foreign exchange. A DRC greater than one means that more domestic currency is required to generate a unit of foreign exchange and therefore the industry is an inefficient generator or saver of foreign exchange. When market prices and nominal exchange rates are used, the financial DRC ratio is obtained (the measure of the competitive advantage of the industry). In an economic analysis, market prices are adjusted to account for the effects of government intervention and noncompetitive market structure. The result is 'shadow prices'. When shadow prices and exchange rates are used, the economic DRC ratio is obtained (the measure of the comparative advantage of the industry).

in copra production. Its DRC ratio was 1.91 for planting hybrid coconuts (McGregor 1998). Fiji's inefficiency is linked to higher labour costs, lower productivity and a higher domestic exchange rate.

2.6.1 COPRA PRODUCTION

A farmer's decision to make copra is based on the returns to effort compared with returns to an alternative use of labour resources — whether the alternatives are other income-earning activities, meeting social obligations or leisure activities. Table 2.5 shows the returns to labour from making copra under a range of price scenarios.

For many rural households, copra still provides the only reliable source of cash income, albeit meagre, to meet life's necessities (kerosene and school fees) and small luxuries (rice, tinned fish and cigarettes). While there is no established rural wage in SI, $15/day can be taken as a guide. This rate was used by the Community Peace and Restoration Fund (CPRF) Roads Programme for payment to ex-combatants and community members to work on road rehabilitation on Malaita. Workers at the North Malaita Tinytech copra oil mill are paid $150 a fortnight for a five-day week. Thus, even at a low copra price of $600/tonne, the return to effort of about $25/day is quite acceptable. In situations where there are alternative sources of income, such a return is not acceptable and farmers will stop making copra. The Western Province provincial report (see Volume 4, Chapter 9) notes that the people of Kolombangara are not prepared to cut copra during periods when logging royalties become payable.

Table 2.6 shows the results of converting the return from making copra in SI into the local currency of other PICs. This is then compared with the prevailing rural wage rates in those countries. In Tonga, the prevailing rural wage rate is around 30 pa'anga (approximately $112) a day. This relatively high rate is driven by alternative income from squash, vanilla and, most importantly, remittances from Tongans living abroad. Thus it is not surprising that the Tongan copra industry has long been extinct. The Fijian and Samoan industries face extinction where the return relativities do not favour copra, although the differences are not as extreme as for Tonga.

Table 2.5 Copra returns in Solomon Islands

LABOUR (PERSON-DAYS/TONNE DRY COPRA)	
Cutting copra (69 kg copra/person/day, equivalent to 230 kg green copra)	14.5
Cutting and carting firewood	2
Drying and turning copra	3
Sorting	1
Bagging	1
Transport to buying point	2
Total	**23.5**
Return per person-day of effort ($)	
Price per tonne of copra at the drier	
$600	$26
$700	$30
$800	$34
$900	$38
$1000	$43

Source: Author's calculations

2.6.2 PLANTING COCONUTS

A feature of many PIC copra industries is the preponderance of senile palms (>80 years). In Fiji, many of the palms that make up the reported 77 500 hectares under coconuts have lived across three centuries. Such trees make an ideal feedstock for a coconut timber industry but yield very little in the way of coconuts. Fortunately, by comparison, the stock of coconut palms in SI is relatively young. A survey of smallholder plantings in 1974 estimated that 37% of palms were immature and another 40% were less than 15 years old (Jones et al 1988). These findings were further confirmed by the 1985 Smallholder Coconut Survey, which showed that the age distribution of SI coconuts was greatly skewed towards young palms (Anon 1986). The replanting was the result of a number of government-sponsored planting subsidy schemes. Since 1985, there has been very little systematic planting of coconuts. Without substantial replanting over the next decade, the age distribution of the SI coconut palms will begin to be biased towards palms entering a declining production phase.

Table 2.6 Returns from making copra compared with rural wage rates, various PICs

COUNTRY	LOCAL CURRENCY	SI$/LOCAL CURRENCY[a]	RETURN PER DAY OF PERSON EFFORT AT DIFFERENT COPRA PRICES					RURAL WAGES IN LOCAL CURRENCY	ALTERNATIVE INCOME SOURCES
Solomon Islands	SI$	1.0000	26	30	34	38	43	SI$15	Cocoa in some locations
Fiji	FJD	0.2291	5.85	6.82	7.80	8.77	9.75	FJD10–15	Kava, taro, domestic remittances
Tonga	TOP	0.2684	6.85	7.99	9.14	10.25	11.42	TOP30	Vanilla, squash and overseas remittances
Samoa	WST	0.381	9.73	11.35	12.97	14.59	16.21	ST16	Domestic market crops, whole coconuts, overseas remittances
Vanuatu	Vatu	14.775	377	440	503	566	629	Vatu500–600	Kava, cattle grazing

FJD = Fiji dollar, TOP = Tongan pa'anga, WST = Samoan tala, Vatu = the Vanuatu unit of currency

a Westpac cheque buying rate at 17 November 2004

Table 2.7 Results of simulating the impact of increasing prices and yield and reducing drier cost on the financial returns from planting 2 hectares of coconuts

	AVERAGE ANNUAL GROSS MARGIN/HA ($)	AVERAGE RETURN FOR FAMILY DAY OF LABOUR ($)	AVERAGE NPV/HA ($)	NPV/PERSON-DAY OF LABOUR ($)
Base case	316	15	262	12.1
(a) 15% increase in copra price	437	20	370	17.0
(b) 15% increase in copra yields	437	18	370	15.7
(c) $2000 reduction in the initial copra drier cost	378	17	319	14.7
Combination of (a), (b) and (c)	826	35	723	30.6

NPV = net present value

Source: Authors' simulations

Appendix 3.1 presents a model of the returns from producing top-quality copra using a flue. It is based on the situation of a North Malaita smallholder who plants 2 hectares of local tall coconuts. The palms begin bearing in their fifth year, with full production achieved in year 10. Each seedling has an imputed value of $5. The farmer has invested in a steel flue for his drier that enables top-quality copra production. The flue and other materials cost $5000. This is based on current CPRF costing in the copra rehabilitation program. It is assumed that the drier is shared with other farmers, with this particular farmer meeting half the cost. The investment in a steel flue is made in year 5 and the flue is replaced in year 12. The model shows that at prevailing prices the average annual gross margin is $316/hectare and the return per person-day of effort is only $15. If a 10% discount rate is applied, to bring the return to present value terms, then the return per person-day of effort is only $12. At these extremely low rates of return, people are unlikely to plant significant numbers of coconuts.

However, higher prices, higher yields or reduced start-up costs might give farmers an incentive for replanting. Table 2.7 shows how returns to farmers might change under such conditions.

Higher prices might be expected from an improvement in copra quality. The use of the steel flue in the drier should lead to a substantial improvement in quality because the smoke damage associated with fuel drum burners is avoided. Copra prices need to reward growers for improving quality.

Higher yields might be expected if better varieties are planted. In principle, earlier production and higher yields would be achieved if hybrid coconuts are planted. SI, unlike neighbouring Vanuatu, does not have a history of a successful hybrid coconut planting program for smallholders.[9] Back in 1983, Smith suggested that smallholders should be encouraged to plant selected Solomon tall–Rennell tall hybrids, because each variety was known to perform well under conditions of low management (Smith 1983). This recommendation is just as valid today. However, a network of small hybrid seed gardens would have to be established to support such a program, which would also have to include the free distribution of seed nuts.

Lower costs might be expected if the steel flue was initially made available at no cost to the farmer. Under CPRF's Copra Industry Rehabilitation Program, a pilot scheme was introduced to distribute copra driers. This pilot scheme should be expanded, but in future only the steel pipe and chimney component of the drier should be distributed free of charge. The widespread use of steel flues in driers should lead to an improvement in copra quality, with a corresponding improvement in the prices received and, hopefully, encouragement for coconut replanting.

2.6.3 CONVENTIONAL COPRA OIL MILLING

Until the late 1990s, there were nine conventional crushing mills operating either directly or indirectly under CEMA. Conventional copra milling involves the extraction of oil by passing shredded and heated copra through very powerful presses (expellers). This process yields virtually all the oil present (more than 60% of the dry weight of the copra). The residue of 35–40%, known as copra cake or meal, is used primarily as livestock feed. The crude coconut oil is usually shipped to a developed country where it undergoes further processing to remove undesirable colours and aromas.

No data are available for assessing the financial and economic performance of CEMA's crushing mills. However, studies undertaken elsewhere raise serious questions about the economic wisdom of SI reinvesting in conventional copra milling operations. In a study of the economics of conventional copra milling in Fiji and Samoa, Wall (1986) found the production of crude coconut oil to be a very low value-added activity. He concluded that conventional copra milling was an energy- and capital-intensive activity and that it created few jobs, even when run efficiently. In subsidised industries, positive domestic value added did not translate into positive figures at world market prices.

There is no reason to expect the situation in SI to be greatly different from that observed in Fiji and Samoa. With conventional copra milling offering little or no value added, the strategy for the rehabilitation of the coconut industry ought to be two-pronged:

- There should be an immediate emphasis on helping to support the basic viability of copra exports.
- The industry should be encouraged to move towards selected value-added uses for coconuts, including the production of high-quality virgin coconut oil and biofuel.

2.6.4 VIRGIN COCONUT OIL PROCESSING

As discussed above, there are two types of virgin coconut oil processing currently operating in SI: the DME method and the Tinytech cold press method. The financial performances of the two different approaches are assessed below.

9 Jones et al (1988) note that after World War II, numerous varieties, including dwarf–tall crosses, were introduced and tested. Many of these trials were undertaken by the Joint Coconut Research Scheme, which was jointly funded by Levers and the Solomon Islands Government. Since the early 1970s, as a result of this research, there has been improved planting material available. The new varieties are mainly Rennell tall, Malayan dwarf–Rennell tall crosses, Malayan dwarf–Solomon Island tall crosses, and Malayan dwarf–Malayan tall crosses. Despite this, Rennell tall and Local tall are the only varieties planted by smallholders in significant numbers.

Table 2.8 The relationship between DME financial viability and throughput

THROUGHPUT (LITRES PER YEAR)	AVERAGE ANNUAL GROSS MARGIN ($)	AVERAGE NPV @ R(I) 10% ($)	IRR
12 500	7 060	3 363	32%
12 000	**5 790**	**2 584**	**27%**
11 000	3 251	1 026	17%
10 000	712	–532	5%
9 000	–1 827	–2 090	negative

r(i) = rate of interest, IRR = internal rate of return, DME = direct micro-expeller

Table 2.9 The impact of producer purchase price on DME viability

THROUGHPUT (LITRES/YEAR)	$/PERSON-DAY WITHOUT DEBT SERVICES	$/PERSON-DAY WITH DEBT SERVICING @ 8% R(I)	$/PERSON-DAY WITH DEBT SERVICING @ 14% R(I)
Current purchase price			
12 500	27	19	17
12 000	25	18	16
11 000	23	15	13
with a 10% increase in the buying price			
12 500	32	24	22
12 000	30	23	21
11 000	27	20	18
with a 15% increase in the buying price			
12 500	34	27	25
12 000	33	25	23
11 000	29	22	20

Source: Author's calculations

Table 2.10 The effect of improving copra quality on the financial viability of a cold press copra oil mill

COPRA PURCHASE PRICE ($/KG)	OIL SALE PRICE ($/LITRE)	ANNUAL AVERAGE GROSS MARGIN ($)	ANNUAL AVERAGE NET PRESENT VALUE R(I) 10% ($)	IRR
Present situation				
$1	$3	–$19 233	–	neg
Purchasing high-quality copra				
$1.30	$3.45 (a 15% increase)	$33 171	$16 063	47%
$1.30	$8 (the current DME price)	$408 567	247 464	infinite

DME = direct micro-expeller, IRR = internal rate of return

Source: Author's simulation

The DME method

The data for assessing the financial performance of the DME model are derived from information generously supplied by the Gap Trading DME operation at Asimana Southern Malaita and by Colin Dwyer of KPSI. The enterprise presented in Appendix 3.2(1) has the following characteristics:

- labour is hired (at a rate of $2.83/litre produced, shared between six people)
- an average output of 250 litres per week is achieved over a period of 48 weeks
- there is an oil price of $8/litre at site for oil shipped to Honiara and $10/litre for oil sold on location
- nuts are purchased at $2 each
- initially, 5% of purchased nuts are rejected for DME use; the rejection rate falls to 3% by year 3
- all shipping costs and the cost of oil containers are met by the buyer
- the turnkey capital cost of equipment is $70 600 (including a generator)
- repair and maintenance are 10% of capital cost
- the generator is replaced after five years and the whole unit after 10 years
- a loan of $100 000 is taken to cover the initial cost of the capital equipment and some provision for working capital (interest rates of 14% and 8% are applied to the loan).

As shown in Appendix 3.2(1), the virgin coconut oil processing enterprise is reasonably financially viable. Over the 10-year period, it generates an annual average gross margin of nearly $5800. When a 10% discount rate is applied, the average net present value (NPV) is almost $2600. The overall internal rate of return (IRR) for this investment is 27%. The enterprise could service a loan if the interest rate were 8%, but not if it were 14%, which is at the lower end of rates currently prevailing in the SI commercial banking system.

At its current performance, the Asimana DME is readily achieving a throughput of 250 litres of virgin coconut oil per week (extrapolated to 12 000 litres per year). This rate is well above the throughput that other PIC DMEs have achieved. As Appendix 3.2(1) and Table 2.8 show, financial viability decreases sharply as throughput falls. Thus, unless other prospective DME enterprises can match the performance of Asimana, they will not be financially viable.

The models presented in Appendix 3.2(1) and Table 2.8 depict a situation where the enterprise pays wages to labour (the situation at Asimana). A more likely situation is for a DME to be operated by a household, where the surplus is distributed among the members. No wages are paid and the residual represents the returns to household labour. Appendix 3.2(2) shows the returns to labour for the base situation depicted in Appendix 3.2(1); however, with no wages paid. The analysis suggests that the DMEs offer quite low returns to labour, even when reasonably well used. This enterprise earns household members a return on their labour input of $25 per person-day. If debt servicing of a $100 000 loan is taken in to account, the returns per day reduce to $18 (8% interest). Even without debt servicing, the return per effort is lower than that which can usually be earned from making copra (see Table 2.9). However, the DME provides more congenial work than making copra and provides an opportunity for women's employment.

Despite the current relatively low returns to labour on offer from the DMEs, it is reasonable to expect that it will be feasible to pay higher purchase prices to growers in the future. Foale (2004) reports that fob prices of US$3–4/litre are not uncommon for virgin coconut oil. It is understandable that KPSI has started operations offering reasonably modest buying prices. The company needs to develop markets and achieve some economies of scale to help cover substantial overhead costs, not the least of which is the high cost of obtaining organic certification for suppliers. With organic certification now in place, the company expects to be in a better position to develop and expand markets. A sizeable domestic market has been identified for edible oils. This will take time to develop. The proprietors of Kokonut Pacific indicate that they expect to be able to pass on significant price increases to their producers over the next few years. It will be necessary for them to do so if the high current

producer interest is to be maintained. Table 2.9 examines the impact of 10% and 15% price increases on the returns to labour from a DME operating at various throughput rates.

The cold press method

The data for assessing the financial performance of this method are derived from information generously supplied by John Volraith, Tropical Products Ltd in Honiara, and the owners of the North Malaita Tinytech milling operation, David Kapuio and Jane Waetara. The enterprise presented in Appendix 3.2(3) has the following characteristics:

- eight bags of copra are processed per day for 310 days per year (approx 186 000 kg of copra per year)
- the milling plant is operated by two workers and a leading hand
- an oil price of $3/litre at site is paid for oil shipped to Honiara
- copra is purchased for $1/kg at the factory
- the seller is responsible for all shipping costs
- the turnkey capital cost of equipment is $125 000 (including generator and buildings)
- repair and maintenance is 10% of capital cost
- the generator is replaced after five years and the whole unit after 10 years
- a loan of $150 000 is taken to cover the initial cost of the capital equipment and some provision for working capital (interest rates of 14% and 8% are applied to the loan).

Under the current arrangements, the milling operation is not financially viable. It generates negative rates of return even before any debt servicing is attempted. Over the past six months, the milling operation has been under considerable cost price pressure. The copra purchase price has increased from around $600/tonne to $1000/tonne, with no increase in the oil price over that period. The cost and frequency of transport have also been a major constraint to viability. The estimated cost of shipping approximately 75 000 litres of oil to Honiara is about $94 000 (including the cost of the drums). At around $1.25/litre, this represents more than four times the purchase price of the oil. Without regular scheduled cargo shipping, the venture has had to rely on persuading passing charter vessels to collect the drums of oil. The bargaining position in persuading such ships to call is now undermined because there is no jetty at Malu'u. Long delays in shipping oil out interrupt the cash flow to the enterprise and limit its ability to buy copra. It is recommended that a small jetty be built at Malu'u as part of the CPRF community-based road program.

If good-quality copra is used, the Tinytech cold press copra mill has the potential to produce oil of equivalent quality to a DME mill. The cold press model presented in Appendix 3.2(3) is receiving a price less than a third of that currently received at DME mills, when transportation costs are taken into account.

The cold press mill could benefit significantly from the distribution of steel drier flues in the area, which would enable the production of high-quality copra. Table 2.10 simulates a situation where high-quality copra is used (paying $1.30/kg). It shows the impact of two situations involving an oil price increase: one where the price is $3.45/litre (a 15% increase) and one where the price is $8/litre (the current DME price). The simulation assumes that the cold press copra oil buyer has access to markets that will pay a price premium for quality oil. Tropical Products could benefit from assistance in the identification of markets.

A modest 15% increase in the oil price is sufficient to transform the enterprise into one with a reasonable degree of financial viability — although it would not be able to service a $150 000 start-up loan at 14% interest. The results assume that a high level of throughput is obtained; this is not currently occurring at the North Malaita operation, because of a shortage of working capital and difficulty in being able to compete for available copra. If the enterprise received the same oil price as the DME producers, it would be highly viable and would have no difficulty in servicing a start-up loan at a 14% rate of interest.

Conclusion concerning virgin coconut oil production

The production of virgin coconut oil offers considerable promise for significant industry value added and diversification. The priority requirement to realise this potential is to increase the financial viability of existing operations. This involves increasing the price received by growers and reducing their cost of operation. Interventions to facilitate this are recommended below.

2.7 RECOMMENDATIONS

As result of the issues analysed above, the following recommendations are made to help rehabilitate the SI coconut industry:

- The CPRF pilot copra drier distribution program should be expanded. In an expanded program, it is recommended that only the steel flue and chimney component be provided.[10] The widespread adoption of steel pipes in copra driers will improve copra quality[11] and reduce the waste of firewood in copra drying. The flue is the key component in the drier, and it cannot be substituted with other materials. However, it is not readily available to farmers. Farmers who have already taken the initiative to rehabilitate their driers using second-hand oil drums should be given priority in the distribution program. For these farmers, a new steel flue would be a welcome 'upgrade' to reward initiative already taken. A priority location for the distribution of steel flues should now be Malaita, particularly around the North Malaita Tinytech copra oil mill, which is suffering from the lack of quality copra availability.
- There should be a promotional campaign to encourage the increased use of virgin coconut oil as cooking oil on the local market. This should be a joint effort involving CEMA, Tropical Products and KPSI. CEMA has already taken some initiative in this area with some coconut promotional efforts in schools. The support should be in the form of assistance in preparing advertising campaigns and promotion materials, such as posters.
- There should be marketing support for virgin coconut oil. This would include five years of support for meeting the overhead costs of organic certification. It might also include such things as website development. Assistance should be given to cold press copra oil producers in the identification of export market buyers.
- A small, once-off injection of working capital for buying agents in more remote locations should be provided. The identified areas include the Shortlands, north New Georgia, Western Isabel and the Guadalcanal Weather Coast. The proposal is for three months of working capital, provided in separate, monthly instalments. Each instalment would be paid on evidence that 10 tonnes of stock had been accumulated by the trader. It is suggested that the scheme be administered by CPRF on the advice of CEMA.
- A small jetty should be constructed at Malu'u on North Malaita to facilitate the transportation of oil from the cold press mill. This should be undertaken as a part of CPRF's community-based road rehabilitation program in the area. The CPRF engineer believes a low-cost jetty could be constructed at Malu'u using gabion walls.
- There should be ongoing technical assistance in the development of biofuel.
- A small, coconut seed garden network should be re-established to distribute improved planting material (selected Solomon tall and possibly Solomon tall x Rennell tall hybrids) for coconut replanting.

10 Initially, the CPRF pilot scheme provided a complete drying system based on the 'kukum' copra drier design. The package included the steel flue pipe (either 8" or 13"), with an attached chimney, meshing for the drier bed, and flat iron for the drier side. Roofing iron for the drier and storage was also provided. The cost of a complete 13" unit with a storage shed attached (excluding timber, sand, gravel and freight) was approximately $20 000. The current cost (ex-Honiara costs) of a 3" gauge steel flue with a chimney is $2600 (8") and $4700 (13").

11 For many years, it has been standard industry practice to use used fuel drums as burners in copra driers. Fuel drums quickly burn out; if not immediately replaced (which they seldom are), the copra is contaminated by smoke. A 3" steel flue, if regularly used, can last for many years before requiring replacement.

3 Oil palm

3.1 INTRODUCTION

Oil palm was Solomon Islands' (SI) most successful agricultural industry in terms of efficiency, international competitiveness and foreign exchange generation before the ethnic tension. This entirely plantation crop was grown by Solomon Islands Plantations Ltd (SIPL) on 6000 hectares on the Guadalcanal Plains. In 1998, 36 900 tonnes of palm oil products (palm oil and palm kernel oil), were exported for a fob value of $94.2 million. The closure of the SIPL factory in 2000 has had a devastating impact on foreign exchange generation. The recent announcement that New Britain Palm Oil Ltd (NBPOL) has signed an agreement to take over SIPL's oil palm operations is encouraging news for the national economy. NBPOL is Papua New Guinea's (PNG) leading oil palm company and has a proven record in raising finance for large oil palm development projects. The standard model for NBPOL operations is a nucleus estate and large numbers of block-holding out-growers supplying a central processing facility. NBPOL provides a guaranteed market outlet for associated smallholders, as well as technical extension services and credit in the form of production inputs. The company exercises a degree of management control over the smallholders' production and postharvest practices, and takes responsibility for the general wellbeing of the smallholder farm household. It is encouraging to note that in PNG, NBOPL has pioneered the development of innovative approaches for introducing oil palm cultivation on customary land.[12] With the experience and approach of NBPOL, there is now optimism that past landowner problems that plagued the SI oil palm industry can be minimised in future.

3.2 MARKET PROSPECTS

Worldwide, approximately 90% of palm oil is used for edible purposes. The stability of palm oil at high temperatures makes it one of the most widely used frying oils. It is commonly used in domestic and industrial margarine formulations, as well as in shortenings for industrial pastry making. Palm oil, in contrast to coconut oil, has been a 'star performer' among vegetable oils. In the 1960s, it ranked eighth in terms of world production and second in terms of exports. Today, the production of palm oil is almost equivalent to that of soybean oil, and it is the leader in terms of exports. The success of palm oil can be attributed to its high oil yields, which are four to five times that of its nearest oil seed competitor (Liwang 2003). SIPL was achieving yields comparable to those achieved in PNG, which are among the highest in the world.

12 Under the Kulu-Dagi Oil Palm Project, NBOPL leases the land from a company established and owned by local customary landowners. NBOPL pays an annual rental and, once the oil palms come into production, pays a royalty on the marketed crop to the smallholder-owned company.

The market prospects for oil palm products are favourable. Given its efficiency in production, palm oil could expect to gain more than other vegetable oils in a freer trade environment. As a processed product, palm oil also stands to benefit the most from a reduction in tariff differentials between oil seeds and oils (McGregor 2003).

3.3 INDUSTRY EFFICIENCY

No formal studies have been conducted on SI competitiveness and comparative advantage in oil palm production. However, studies carried out in PNG show the oil palm industry to be highly internationally competitive, particularly at the export level (Kannapiran and Fleming 1999). Analysis of oil palm production on Guadalcanal would probably give similarly good results, particularly given the significantly lower value of the SI currency.

3.4 INDUSTRY PROSPECTS AND CONSTRAINTS

Products from the highly efficient SI oil palm industry faced good market prospects. However, with the destruction of the SIPL factory and the ceasing of operations, the future of the industry looked bleak. The Guadalcanal provincial report (see Volume 4, Chapter 3) notes 'that it would require US$17 million to rebuild the infrastructure and get the plantation and factory operational again. The land leases have been challenged by local landowners and there is a history of labour issues, including the unwillingness of local landowners to have workers from Malaita return to work on the plantation'. Against this background, it is encouraging that a company of the stature of NBOPL has decided to invest in SI. This decision reflects the potential returns to be made from successful investment in oil palm.

The Malaysian oil palm industry has now reached its limits for area expansion (Corely 2003). This offers expansion opportunities for industries in Indonesia, PNG and now SI. There are still large areas of Guadalcanal Plains that would be highly suitable for oil palm. Most of this land is held under customary tenure. Hence, any significant expansion of the oil palm industry will need to be based on smallholder production, involving traditional landowners.

Despite the potential, care needs to be taken not to allow the planting of oil palm in locations that are unsuitable. The planting of 800 hectares of oil palm on Vangunu Island in Marovo Lagoon is an example. The Western Province provincial report (see Volume 4, Chapter 9) comments at length on the inappropriateness of this development:

The site is steep and unsuitable for oil palm without terracing. Much of the area should not have been logged initially; soils are poor and will require heavy inputs of fertilisers (Wall and Hansell 1976a). Runoff from the plantation goes directly into the lagoon, threatening marine ecosystems, livelihoods and lucrative ecotourism. The indigenous Marovo community is deeply divided over the logging (Hviding and Bayliss-Smith 2000), and the need to employ thousands of non-Marovo labourers for the proposed plantation. The proposal is seen by many as an attempt by the logging company to back- and clear-fell remaining forest by obtaining an agricultural licence. Clear-felling and logging are, apparently, continuing unabated on alienated and neighbouring customarily owned land, but oil palm planting is significantly behind schedule. The company now claim that the original alienated land is unsuitable, and so they have to log (clear-fell) adjacent customary land. The environmental (and social) costs of the plantation have not been taken into account, and the net economic benefits of the oil palm are less than those from traditional and alternative uses of the land (LaFranchi 1999, Shearman 2000). In short, it is hard to imagine a less appropriate form of 'development' for Marovo Lagoon.

3.5 RECOMMENDATIONS

No specific interventions for AusAID involvement have been identified. However, in the future there may be opportunities to work with NBOPL to facilitate smallholder participation in the industry.

4 Cocoa

4.1 INTRODUCTION

Much of the arable land in Solomon Islands (SI) is suited to cocoa production, although in many locations the excessively high rainfall creates problems for the management of fungal diseases.

Cocoa has been the third most important export crop and was the least affected by the recent ethnic tension (see Chapter 1, Table 1.3). Average production for the nine years before the ethnic tension was around 3500 tonnes. Between 1999 and 2002, production of cocoa fell by around 1000 tonnes; however, in 2003, production reached a record level of 4600 tonnes. In 2004, annual cocoa production was 4181 tonnes.

The robustness of the predominantly smallholder cocoa industry in these difficult circumstances can be attributed to a number of factors:

- there were relatively favourable world market prices in 2002 and 2003
- cocoa is grown as part of a traditional mixed cropping system, giving reasonable returns to labour even when prices are relatively low
- there was a competitive marketing system, in which buyers actively competed for beans
- the marketing system remained essentially intact in the main production areas of Guadalcanal and Malaita (although the cocoa marketing system in the Western Province was severely affected by the collapse of the copra marketing system and the resulting impact on shipping)
- cocoa was better able to absorb increases in shipping costs due to its relatively higher unit value.

4.2 INDUSTRY BACKGROUND AND STRUCTURE

The development of cocoa as a significant industry dates from the 1950s. It was based on Amelanado variety seed imported from Kerevat in New Britain. Previous efforts to establish cocoa in SI were unsuccessful because they were based on Trinitario varieties that were highly susceptible to black pod (*Phytophthora palmivora*) fungal disease in the high-rainfall conditions. The Amelanado variety is higher yielding and is relatively tolerant to black pod, as long as reasonable husbandry and sanitation practices are carried out.

The major expansion in the cocoa industry occurred in the mid-1980s. At that time, Levers and Solomon Islands Plantation Limited undertook substantial plantings with some Papua New Guinea (PNG)-developed hybrids. Today, the industry is almost entirely smallholder based. Cocoa is grown in all provinces except Rennell/Bellona. According to the Village Resources Survey (Ministry of Finance 1997), 1626 villages grew cocoa, which made it the second most important cash crop after copra (see Chapter 1, Table 1.2). Cocoa production is now concentrated in Guadalcanal and Malaita (see Table 4.1). Before 2000, Western and Choiseul provinces were also significant producers.

The Commodities Export Marketing Authority (CEMA) has been involved in cocoa marketing, but never had the monopoly status that it had with copra. In contrast, in Fiji, Samoa and later Vanuatu, parastatal bodies were monopoly marketers of cocoa. This was to the detriment of the returns to growers and the development of their cocoa industries. Consequently, a competitive cocoa marketing system that is well suited to the heterogeneous nature of cocoa market requirements developed in SI. In 2003, there were 17 cocoa exporters licensed by CEMA. They shipped volumes ranging from 10 to 1000 tonnes. Such a number is excessive for an industry producing little more than 5000 tonnes. A shipper of small lots can expect to receive significant price discounts. However, overall the competition in SI has resulted in relatively low marketing margins, which has been highly beneficial to growers. In Fiji, Vanuatu and Samoa, lack of competition and inefficiency led to huge marketing margins, ranging from 30% to 45%.

Virtually all SI cocoa exports have been through Singapore — with smaller shipments occasionally made to New Zealand and, surprisingly, Malaysia and Indonesia. There are essentially two buyers of SI cocoa: Sydney-based Holland Commodities and Singapore-based Lonswiss.

4.3 MARKET PROSPECTS

The high prices of cocoa in the late 1970s and early 1980s resulted in large increases in cocoa planting, particularly in Malaysia, Indonesia, and Cote d'Ivoire. This production continued over the next decade, at a time when demand had slackened due to the economic problems of eastern Europe. Large stocks of cocoa crowded the market for more than a decade, leading to a price trough of unprecedented duration. The smallholder-based cocoa industry survived the price depression of these two decades essentially intact, because competitive marketing guaranteed a modest, regular source of income to farmers with few alternatives.

During the 1990s, world cocoa stock levels steadily decreased. This was the result of declining production in Malaysia and Brazil, and steadily increasing demand. By 2000, stocks reached their lowest levels in several decades. Over 2001–02, the ratio of stocks to grindings fell further, to below the critical 40% of grinding threshold, and prices started to increase. In 2002, when civil unrest began to impact on Cote d'Ivoire cocoa production, prices began to increase sharply.[13] In October 2002, the average monthly price of cocoa reached US$2300/tonne (1673 SDR/tonne) — the highest nominal price since 1986. Prices receded when civil order was largely restored to Cote d'Ivoire. The average daily price during August 2004 was 1180 SDR/tonne — still more favourable than the price that prevailed in 1999–2001. However, in November 2004, the civil unrest in Cote d'Ivoire escalated, pushing cocoa prices to more than 1200 SDR/tonne.

Apart from the continuing turmoil in Cote d'Ivoire, the market fundamentals for cocoa in the medium term remain favourable. Table 4.2 shows the medium-term price forecasts made by the International Cocoa Organisation at the end of 2003.

At farm prices derived from these forecasts, smallholders will receive a reasonable return to effort for planting, maintaining and harvesting cocoa (see Appendix 3.3(1), Appendix 3.3(2) and Table 4.3).

4.3.1 QUALITY AND PRICES

The world cocoa market distinguishes two broad categories of cocoa bean: 'bulk' and 'fine' or 'flavour' cocoa beans. Bulk cocoa includes the Amelanado variety, which is the dominant variety grown in SI. The large cocoa producers, such as Cote d'Ivoire, produce entirely bulk cocoa. 'Fine' or 'flavour' cocoa, which includes some PNG production, normally receives a price premium.

Unlike coffee, chocolate is seldom distinguished by the country of origin of the ingredients. However, there are perceived quality differences for beans sourced from different locations and of different types. From a practical trade perspective, quality is important in several main areas. The important aspect of flavour depends primarily on

13 Cote d'Ivoire is the world's largest cocoa producer, accounting for about 40% of world exports.

Table 4.1 Cocoa production by province

PROVINCE	WESTERN	CHOISEUL	ISABEL	CENTRAL	GUADALCANAL	MALAITA	MAKIRA	TEMOTU	TOTAL
Tonnes produced (2002)[a]	7.9	0.6	75.7	262.6	2841.9	1054.4	360.1	14	4 617.2
% of total	0.17	0.01	1.64	5.69	61.55	22.84	7.80	0.30	
No. of villages growing cocoa 1995–96[b]	25	24	119	79	494	659	169	57	1 626

Source: a CEMA, b Ministry of Finance (1997)

Table 4.2 Medium-term cocoa price forecasts (constant 2002 SDR/tonne)

	SDR	US$	SI$
2003–04	1 633	2 447	18 046
2004–05	1 323	1 982	14 620
2005–06	1 205	1 805	13 316
2006–07	1 254	1 879	13 858

SDR = special drawing rights (of the IMF)
Source: International Cocoa Organisation, Quarterly Report, September 2003

postharvest processing (fermentation and drying). Poor fermentation results in excessive free fatty acids. Poor drying will dilute natural flavours and create mould. Poor drying facilities can result in an undesirable smoky flavour. Poor postharvest processing adversely affects the quality, and thus the prices, of SI cocoa.

Price premiums and discounts apply depending on quality criteria. Significant quality discounts generally apply to SI cocoa. AgMark, PNG's largest cocoa exporter, occasionally buys SI cocoa for on-shipment to Singapore. AgMark reports that SI cocoa is discounted by approximately US$50/tonne, because of its quality, compared with cocoa from PNG (John Nightingale, Managing Director, AgMark, pers comm, March 2004). The main reasons cited are poor fermentation and poor drying. As with copra, improving quality should be a priority.

4.3.2 NICHE MARKET OPPORTUNITIES: ORGANIC AND FAIR-TRADE CERTIFICATION

There are opportunities for SI to develop markets based on environmental sustainability, capitalising on the increasing health concerns and environmental awareness of consumers. SI has a number of distinct advantages in developing certified organic coconut and cocoa industries:

- SI is perceived to be a relatively unpolluted and unspoiled environment
- there is an opportunity to use existing traditional and sustainable production systems
- there is a high demand for certain products that it is technically feasible to produce organically in SI (coffee, cocoa, coconut products and spices)
- donors are willing to provide technical assistance to support organic agriculture.

Direct micro-expeller (DME) coconut oil producers have taken the lead with organic certification. Industries such as cocoa now have opportunities to build on this effort. There is particular interest in organic cocoa in Europe due to the high pesticide residue levels found in some chocolate manufactured from African and South American beans. Since the early 1990s, the market growth for organic cocoa is reported to be 10–15% annually, with price premiums of up to US$200 for quality product.[14]

14 See http://www.sippo.ch/files/publications/bio-kakao

Websites report that Vanuatu is exporting 500 tonnes of organically certified cocoa to Germany annually.[15] European Union aid funds have been used to support the Vanuatu certification program.

The Solomon Island DME oil producers were recently organically certified by the Australian certifying agency, the National Association for Sustainable Agriculture, Australia (NASAA). The coconut production areas that were organically certified on Malaita also contain significant amounts of cocoa. Thus there is an opportunity to develop a niche market for organic cocoa. Minimum volumes of 10–20 tonnes would be required to justify shipments. As this would take some time to establish, preshipment finance and storage facilities are required. An additional problem for organic beans is how to keep storage pests (eg weevils) out for extended periods in an organically acceptable way.

'Fair-trade' and 'bird friendly' markets also exist for cocoa.[16] These markets are similar to organic markets and they are often complementary. Fair-trade initiatives, as with organic certification, authenticate that the product meets specified rules and provide a label signifying that these rules have been met. The certifiers do not trade in the products. The fair-trade group provides access to markets that provide higher returns to village producers who do not exploit labour and harm the environment. The publicity concerning the exploitation of child labour in West African cocoa industries has given a boost to fair-trade labelling of cocoa in recent years. There are variants of the fair-trade group that concentrate on environment protection, such as the Smithsonian bird-friendly cocoa program.

4.4 VALUE-ADDED PROCESSING

Adding value to any agricultural product is a desirable goal. However, the additional income accruing to the industry must exceed the additional cost involved. Most cocoa is exported as dried beans; however, the larger world producers grind between 10% and 20% of their dried bean production. Much of this domestic grinding is of low-quality beans for domestic consumption (Kotecha et al 2002). Local processors in these countries tend to be subsidiaries of parent companies located in consuming countries.

There are three main factors preventing a small producer like SI from manufacturing cocoa butter or chocolate:

- the domestic market is small, unlike the situation in major producer countries such as Brazil or Cote d'Ivoire
- manufacturers blend batches of cocoa beans from various sources: the bulk grade Amelanado variety grown in SI on its own would not provide the basis for a processing industry, so beans would have to be imported from other sources for blending
- tariff escalations apply to some value-added cocoa products in major markets.[17]

For the foreseeable future, the best value-adding options for the cocoa industry are to improve cocoa quality and then enter speciality niche markets, such as organic and fair-trade markets.

4.5 INDUSTRY EFFICIENCY AND VIABILITY

The average cocoa yield for smallholders worldwide is about 0.35 tonnes/hectare (Kotecha 2003). Yields obtained by smallholders in SI are at about that level or lower (see Table 4.3).

Despite relatively low yields, cocoa seems to be an efficient generator of foreign exchange. In 1998, McGregor estimated the domestic resource cost (DRC) ratio for smallholder cocoa in SI to be 0.34 (McGregor 1998). The low DRC ratio was largely due to the low value of the SI currency and the low-level purchased inputs.

15 See http://www.sippo.ch/files/publications/bio-kakao

16 See http://www.coffee-tea-etc.com/ic/cocoa/producers

17 Solomon Islands dried cocoa beans currently enter the EU duty free. The same applies to cocoa paste, butter and powder, provided they do not contain any sugar. However, if these products contain sugar, the tariff ranges from 13.5% to 18.7% (Kotcha et al 2003)

Table 4.3 Cocoa yields from smallholder plots in Malaita

	AGE OF TREE (YEARS)					
Yield (dry beans kg/ha)	**3**	**4**	**5**	**6**	**7**	**8**
Highest yield	70	384	524	456	469	461
Lowest yield	2	11	20	37	37	48
Mean yield	21	126	215	220	220	173

Source: Friend (1970) cited in Jones et al (1988)

Table 4.4 Impact of investment in facilities to improve cocoa quality

	CURRENT BASE CASE	INVESTMENT IN FACILITIES WITH NO IMPROVEMENT IN PRICE	INVESTMENT WITH A 20% INCREASE IN PRICE	INVESTMENT WITH A 30% INCREASE IN PRICE
Average gross margin per hectare ($)	834	534	772	891
Average gross margin per person-day of labour ($)	30	19	28	32

Source: Author's calculations. See Appendix 3.3 for details of the calculation

4.5.1 RETURNS TO SMALLHOLDERS FROM REHABILITATING AND PLANTING COCOA

For many smallholders, widely spaced cocoa is planted among food crops, and wet beans are sold to larger cocoa farmers who operate fermentaries and driers. Appendix 3.3(1) shows the results of the modelling of such an operation in North Malaita in close proximity to a road where the wet beans can be sold. In November 2004, the prevailing wet bean price ranged from $1.50 to $2.00/kg. In the model shown in Appendix 3.3(1), the household labour used to clear the land and weed the plantation is shared (50%) with subsistence food production.

Despite a low level of cocoa production, a reasonable return to household labour is achieved ($29/person-day at a wet bean drier price of $2/kg). Even if the wet bean buying price falls to $1.50/kg, the return to effort is still reasonable at $20/day.

Farmers who own larger farms, or farmers without access to a wet bean buyer, may chose to produce dried beans. The North Malaita farmer modelled in Table 4.4 has established a 1-hectare cocoa plantation. This is a low input, low output operation that uses household labour. The farmer sells dried beans to a cocoa buyer at the side of the road at the current prevailing price of $5/kg. The beans are dried in the sun using a small drier made from bush materials with a recycled 44-gallon drum. The cost of drier materials is estimated at $1000, and a fermenting box is made from locally sawn timber. The clearing of forest and weeding for the first two years is only partly (50%) attributed to cocoa, because the land is initially used for food production. This small, dried bean enterprise generates a return to labour that is comparable with the smaller wet bean operation. However, the total cash income earned is substantially more, given the average annual labour use for dry beans is 28 days compared with only nine days for wet beans.

The key to increasing the returns to cocoa farmers is to improve quality, provided the pricing system rewards these improvements. Quality improvement is largely achieved through better fermentation and drying. Table 4.4 includes a provision of $5000 for better fermentation and drying facilities. It is assumed that the facilities would be shared with other farmers who meet 50% of the cost. The table shows the impact of various price increases to reward the improvement in quality. There would need to be at least a 25% increase in price to make this investment worthwhile. The

onus is on the industry to put into place grading and pricing mechanisms that adequately reward quality improvement.

The largest cost element in the improvement in cocoa quality is the flue pipe for the drier. This component is both physically and financially difficult for farmers to source for themselves. It is recommended that flues be distributed to selected cocoa fermentaries. This cocoa drier program could be readily combined with the program for copra driers, with initial priority being given to existing Malaitan cocoa farmers.

Despite the encouraging resurgence in cocoa production, plantings have been neglected due largely to disruptions to the marketing system. Cocoa does not tolerate neglect as well as coconut does. A cocoa plantation that is not regularly pruned and weeded soon becomes overgrown, and without adequate light and air circulation, flowering is suppressed and fungal diseases take over. Rehabilitation of an overgrown and unproductive plantation requires radical pruning and cleaning of bush. Within 9–12 months of the plantation being cleaned, reasonable flowering will recommence. One hectare of severely overgrown cocoa could be adequately cleaned up with an initial input of 15–20 days of labour plus an additional 5–10 days of normal maintenance. In the year following this effort, the farm might be expected to yield 400–500 kg of green beans, valued at around $800–1000. The resulting return is about $35–$40 per person-day.

Extension efforts should initially focus on rehabilitating existing plantations rather than encouraging new cocoa plantings. The short-run returns to rehabilitation efforts tend to be relatively higher. Furthermore, world cocoa prices are currently in a relatively favourable phase in the price cycle. It could be expected that by the time the production from any new plantings is completed, prices will have entered the bottom of the price cycle.

The bulk of cocoa plantings occurred during the 1980s, and the plants are now reaching the end of their economic life. There is a need for the industry to commence a replanting program to ensure its long-term sustainability. It is encouraging to note that Holland Commodities, the country's major buyer, has engaged a local company to produce cocoa seedlings for distribution. There is interest in sourcing some of the newly developed black pod-resistant varieties developed by PNG's Cocoa and Coconut Research Institute.

4.6 THE PARTICULAR PROBLEMS OF WESTERN PROVINCE AND CHOISEUL COCOA

During the 1980s, Western Province was the third-largest cocoa-producing region in SI, producing a maximum of 78 tonnes in 1984 (Jones et al 1988). In particular, the Island of Vella Lavella was a major cocoa-producing area. Today, Western Province and Choiseul together account for less than 1% of total cocoa production. Part of the reason for the demise of cocoa in the west has been the breakdown in the market system. While CEMA was only the third or fourth largest cocoa producer, it was the main cocoa buyer in Western Province. CEMA used its network of copra-buying points for the purchase of cocoa. Following the end of CEMA trading operations in 2003, no other entity has filled the vacuum. Any Western Province grower wishing to sell cocoa now has to make individual arrangements for shipment to a Honiara-based exporter. This usually involves accompanying the cocoa on the ship. The situation is expected to change with the recent decision of Western Coconut Products to lease its Munda facilities to Holland Commodities. Holland Commodities is the largest buyer of SI cocoa and will be interested in buying cocoa as well as copra to support its Munda operation.

Another option for marketing Western Province cocoa would be to sell through Bougainville. AgMark, PNG's largest cocoa exporter, is now fully re-engaged in the marketing of Bougainville cocoa. Agmark Shipping frequently calls at a number of Bougainville ports to collect cocoa. These arrangements could be extended to Western Province and Choiseul if sufficient cocoa were available. Such trade would presumably be covered by the Melanesian Spearhead Group (MSG) Trade Agreement.

Western Province and Choiseul cocoa plantings are now run down. There could be special consideration for their rehabilitation. The private sector has expressed an interest in the rehabilitation of cocoa plantations on behalf of landowners, using landowner labour. The company would then lease the rehabilitated plantation for a prescribed period (five years). At the expiration of the lease, the operational cocoa plantation would be returned to the landowners.

4.7 RECOMMENDATIONS

As result of the analyses of the issues discussed above, a number of recommendations are made to help the rehabilitation of SI cocoa industry:

- Steel flues should be provided for cocoa driers as part of the CPRF copra drier program.
- The centralised cocoa facility at Marasa on the Guadalcanal Weather Coast should be rebuilt. It is reported that there is a significant area of bearing cocoa at Marasa on the Weather Coast. This was supported by a centralised dry bean processing facility (fermenting boxes, substantial drier and storage shed), but these facilities were burned down in 2001. It is recommended that they be re-established as part of the targeted Weather Coast rehabilitation program.
- Cocoa should be included in arrangements for support for organic certification.
- The introduction of improved black pod-resistant cocoa varieties from PNG should be facilitated.
- A cocoa specialist should be hired by the Department of Agriculture.

5 Food and fresh produce

5.1 SUBSISTENCE FOOD PRODUCTION

Domestic food production is Solomon Islands' (SI) most important industry. It has been dealt with in detail in Volume 1 (Table 8.1) and Volume 2 (Chapter 1), and in the provincial reports (Volume 4).

Bourke (2004) estimated that staple crop production had a value of $325 million per year. This is a conservative estimate, because it is based on the price of the cheapest source of energy food (imported rice), and it ignores waste and food fed to livestock. No estimate has been made of the value of other vegetable and animal foods, although this would increase this estimate significantly. To put this figure in perspective, the combined export value of the major export crops (copra and cocoa) was $74 million in 2003.

Sweet potato is by far the most important source of food energy in SI. It contributes an estimated 65% by weight of the locally grown staple foods (see Chapter 1, Table 1.1). Bourke (2004) estimates staple food crop production to be about 430 000 tonnes per year. This compares with his estimate of less than 100 tonnes per year produced domestically.[18]

A moderate amount of food is imported into SI, with rice and wheat from Australia being the most significant (see Table 5.1). Imported rice is the staple food for most urban people (who comprise 16% of the national population). Consumption of imported foods in rural locations ranges from negligible in remote locations where there is very limited cash income, to moderately high where there is pressure on garden land and cash incomes are moderately high. Imported rice and wheat flour contribute an estimated 21% of total food energy consumed in SI. The amount of imported rice and wheat flour consumed is comparable to Papua New Guinea (PNG), where all imported food items contributed approximately 20% of food consumed in 1996. However, the amount of imported rice and wheat flour consumed in SI is much lower than for Fiji, where only 39% of energy was derived from local foods in 1994 (FAO 1999). The falling qualities of rice and wheat imports can be attributed to both income and price effects — cash incomes have fallen and the land price of these imported staples has increased sharply in face of the depreciating value of the domestic currency.

The subsistence sector remains highly competitive due to the strength of traditional farming systems and an exchange rate regime that has increasingly favoured domestic food production. However, the various provincial reports point to a sector under increasing strain in the face of declining land productivity and increasing population pressure. Section 5.5 includes recommendations to improve the productivity and thus the viability of the sector.

18 The Department of Agriculture and Livestock claims that about 1000 tonnes of rice are grown in SI each year. The figures that the authors gathered in the field in 2004 indicate that actual production may be as low as 30–50 tonnes and is certainly no more than 100 tonnes for the entire country.

Table 5.1 Rice and wheat imports into Solomon Islands, 1999–2004[a]

	RICE		WHEAT	
Year	Quantity (tonnes)	Value ($ million)	Quantity (tonnes)	Value ($ million)
1998	24 000	44	11 000	13
1999	23 000	42	12 000	15
2000	23 000	50	7 500	10
2001	23 000	46	6 700	6
2002	24 000	54	–	–
2003	20 000	57	–	–
2004[b]	–	–	5 800[c]	–

a The source for rice data is FAO statistics (1998 and 1999) and the General Manager (Brian Hutchinson) of Solrice Ltd (2000–03). The source for wheat imports is FAO statistics (1998 to 2001); and the marketing manager of Global Vision Company Ltd (Matthew Psang) for 2004.

b For the most recent accounting year used by Solrice (May 2003 to April 2004), rice imports were 23 500 tonnes, with a landed value of $79 million.

c The estimate for wheat imports for 2004 is based on the rate for the first eight months of the calendar year.

Source: Bourke (2004)

5.2 DOMESTICALLY MARKETED FOOD

Trade in food and firewood is an important source of cash income for many rural villagers. The marketing system for these items is summarised by Bourke (2004) as follows:

There is a hierarchy of market places within the SI. The largest is Honiara and the surrounding rural area, where most of the 60 000 plus population is unable to grow much of their own food. The second level is the small urban areas of Noro, Gizo, Auki, Tulagi. As well there are very many market places in small 'urban' centres such as Kirakira, Mundo, Buala and Lata; at other government, church and business nodes; and in rural areas. The significance of rural markets varies greatly between islands, and is most developed where there are marked differences in the ecology, resource base and livelihood strategies within one area. For example, in many parts of coastal Malaita, dwellers on artificial islands sell marine foods to those from the inland and coast, and purchase root crops and other garden food in return.

The relative importance of domestically marketed food and other items varies greatly within and between islands. It is most important for those living on the road network in North Guadalcanal and on other nearby islands where there is relatively good access to Honiara market. These include the islands of Savo and Gela in Central Province, most of Malaita and southern Isabel. There is some specialisation, for example, Malaita people specialise in pigs, chickens, taro, betel nut, sweet potato, pineapple and watermelon. People from Savo Island specialise in crops which grow best in a somewhat drier climate, including watermelon, capsicum, tomato, beans and cucumber.

As Bourke notes, it was not possible for him to estimate the value or volume of fresh produce sold within SI — and it is beyond the resources of this volume. However, Bourke notes that the income ranges from very minor and incidental to being the main source of cash income. It is notable that the volume per vendor sold in the Honiara market is often quite large and represents much more than an incidental surplus to subsistence food production. Work in other Pacific Island countries (PICs) suggests that the total volume of trade in domestic food is considerable, particularly considering the vibrant nature of the Honiara market. In PNG, around 5000–6000 tonnes of fresh produce are shipped from the highlands to Moresby annually, generating income of around K10–12 million (ADB 2004).

5.3 FRESH PRODUCE MARKETING AND CONSTRAINTS

5.3.1 INDIVIDUAL FARMER INVOLVEMENT IN MARKETING

A characteristic of produce marketing in PICs is the high level of individual grower involvement in marketing. The exception is Fiji, where there is a much more substantial involvement of middlemen and traders in the marketing chain. In SI, only the betel nut trade seems to have any significant involvement of middlemen and traders in produce marketing. The high involvement of individual growers in produce marketing is explained by a combination of factors:

- a perception that higher returns can be achieved by cutting out the middleman
- poor telecommunications
- lack of confidence in the marketing chain
- the fact that farmers use produce to help subsidise trips to Honiara or to other provincial centres.

The adverse consequences of a high level of farmer involvement in produce marketing are:

- higher marketing costs
- decreased returns to growers
- poorer quality product
- diversion of labour resources from production to marketing activities
- inconsistency of supply flows
- limited market outlets
- increased consumer prices.

5.3.2 MUNICIPAL AND PROVINCIAL MARKETS

The Honiara market is now among the best in the Pacific Islands in terms of the array and quality of produce on offer. A thriving trade has developed around this facility. However, most of the other municipal and open markets leave a lot to be desired in terms of stimulating produce trade. Produce is often directly exposed to the harsh tropical elements, where it quickly deteriorates. Consequently, the income of farmers and traders falls, produce is wasted and consumers buy produce of inferior quality. More affluent consumers often turn to the more 'congenial' environment of supermarkets, increasing the likelihood that they will consume imported produce.

The produce market is the commercial and social epicentre of any Pacific Island community. It is here that most micro- and small-enterprise activities begin. Investment in municipal market upgrading can provide a major stimulant to small-business development and generate substantial economic and social returns. Such investments can range from providing basic produce shelters through to full-scale market redevelopment, as occurred with the Honiara market. Several priority market improvement activities are identified in the provincial reports. These include Noro, Auki and Malu'u (North Malaita).

5.3.3 PRODUCE QUALITY

The inherent quality of much SI produce is excellent. However, this quality is not seen by urban consumers. The problem lies in the supply chain from field to consumer. Efforts to improve produce quality should focus on three main areas:

- research (best varieties for local conditions)
- training and information dissemination on produce handling (farmers, marketers, transport agents and retailers)
- public investment in infrastructure (roads, communications and produce shelters).

5.4 FRESH PRODUCE MARKET OPPORTUNITIES

5.4.1 EXPORT MARKET OPPORTUNITIES

SI has a poor fruit fly status, with two fruit flies of major economic significance: melon fly (*Bactrocera cucurbitae*) and mango fruit fly (*B. frauenfeldi*). Exports of virtually all fleshy fruit and vegetables are not permitted without quarantine treatment. Fiji is the only PIC that has been able to successfully operate a commercial quarantine treatment facility, which targets the New Zealand market. SI does not have the necessary airfreight capacity to consider such an investment. Pineapples are the one fruit

that is not a fruit fly host and can be considered for export to New Zealand. Excellent quality pineapples are grown on Malaita; however, year-round production, correct handling and direct shipping from Honiara to Auckland would be required before exports could be contemplated.

For SI, the best market opportunities for fresh produce overwhelmingly lie with domestic markets, where the exchange rate now clearly favours domestic production. The greatest potential is for the Honiara market, but there are opportunities in some of the smaller urban areas and in some rural locations. For some products, there are also significant opportunities for increased self-sufficiency consumption by rural households.

Improvements in transport infrastructure, both road and marine, will facilitate greater marketing. Apart from traditional staples, some products that have been identified as having considerable scope for expansion are:

- off-season pineapples
- exotic fruit
- bulb onions
- temperate vegetables, particularly various brassicas.

These products are discussed briefly in the sections below.

Off-season pineapples

Pineapples are cultivated throughout SI, but particularly on Malaita. Most are grown by small farmers during the main season. Virtually all this production is confined to a period between mid-November and the end of January, when the Honiara market is flooded with pineapples from Malaita. For the remainder of the year, there are virtually no pineapples available. Through the use of fruiting hormones, pineapples can readily be produced for 10 months of the year. The period in which it is most difficult to achieve fruiting is February and March, after the main season. To have fruit during this period, foliar urea must be applied in May to mid-August to encourage vegetative growth that will allow flowering to be induced in August, allowing harvesting in February and March. Also, monthly planting is necessary to ensure year-round production. The production of off-season pineapples does not involve complicated technology. The farmers simply need to have the correct information explained to them and to have the fruit hormones readily available. For more than a decade, farmers on Santo in Vanuatu have found it profitable to grow and market off-season pineapples. The technology was provided by a farmers association (the Farm Support Association), and the hormone was commercially available at the local farm supply store (Vanuatu Agricultural Supplies). In this respect, SI currently faces an extension and a farm supply constraint. However, an off-season pineapple program could be an appropriate activity for a nongovernment organisation (NGO), such as Kastom Gaden Association (KGA).

Exotic fruit

The Honiara market is characterised by ample supplies of quality bananas, melons and pineapples (in season). There is also a reasonable supply of local dioecious-type papaya and local mangoes in season. There are no rambutans, avocadoes, mangosteens, Hawaiian 'solo'-type papayas or other tropical fruit that would be well suited to the tropical conditions of SI and would be popular with consumers.

It could be expected that a program to distribute exotic fruit trees would be highly successful, with demand for the fruit outstripping supply. The phenomenon of quality fruit availability generating its own demand was clearly demonstrated by the Samoan Fruit Tree Development Project. A range of exotic fruit was introduced, with the objective of developing a fruit export industry. Particular success was achieved with the introduction of an improved variety of rambutan. This fruit thrived in Samoa's tropical environment (UNDP/MAFFAM 2002). Rambutan was found not to be a host to Samoan fruit flies, and a protocol was negotiated for export to New Zealand. However, there has been no surplus fruit available for export so far. As rambutans became more readily available, demand from local people increased. A similar situation could be expected in SI. Much of this fruit may not even enter formal markets; rather, it may be consumed by the households that grow it, resulting in improved nutrition and food security.

It is recommended that the Department of Agriculture and Livestock (DAL), or preferably an appropriate NGO, should have a specific program to introduce exotic fruit trees and distribute their fruit at the household level. This is likely to be best achieved by subcontracting small, private nurseries in selected areas. Malaita would be an appropriate location for a pilot exotic fruit tree project. An extension effort will be required, to give farmers the skills to grow and handle exotic fruit. This includes the growing of off-season pineapples.

Bulb onions

Despite their high cost, SI continues to import substantial volumes of bulb onions. Table 5.2 shows imports for the period 2001–03.

Table 5.2 Bulb onion imports, 2001–03

YEAR	QUANTITY (TONNES)
2001	875
2002	278
2003	757

cif = cost, insurance and freight

Source: Ministry of Trade and Commerce

In 2002, PNG imported only 1380 tonnes of onions (PNG Internal Revenue Commission 2002).[19]

The actual market potential for onions is likely to be considerably more than the current imports if onions are readily available at a reasonable price. Most locally grown onions that do not enter the marketplace will probably be consumed by the communities that grow them.

Bulb onions have demanding crop production and postharvest handling requirements. However, they have been grown successfully in a range of PNG conditions (Wiles 2001). A concerted on-farm research program would be required to successfully introduce this crop, with six key areas to address:

- time of planting
- cultivar evaluation
- production methods
- disease control (especially purple blotch)
- fertiliser requirements
- postharvest storage.

Appendix 3.4 outlines how an on-farm research program might be undertaken.

Brassicas and other temperate vegetables

Similarly to the produce mentioned above, temperate vegetables are notable by their absence from the Honiara market. Members of the *Brassica* family, particularly head cabbages, seem to provide an excellent opportunity for expansion. The PNG experience in achieving self-sufficiency provides a measure of what could be achieved, with the availability of appropriate cultivars supported by applied research and extension. In PNG, there has been a proliferation of vegetable farmers in nontraditional areas outside the highlands, which are not captured in available statistics. This trend is observed particularly in closer proximity to the urban market centres. The change has involved vegetables, such as head cabbage, which have a high value but low volume. Head cabbage is now widely distributed because of the availability of suitable lowland varieties. The 2003 PNG Horticulture Sector Study put total production of head cabbage around 10 000 tonnes (McGregor et al 2004). Due to a marked increase in production efficiency and adoption of improved cultivars driven by a corresponding increase in consumer demand in recent years, local cabbage is more than competitive with imports. The PNG Horticulture Sector Study concluded:

Local head cabbage has now virtually replaced imports. This is the result of the involvement of larger commercial growers and farmer groups in cabbage growing as a result of improved road network, especially in Hagen central district of Western Highlands province (McGregor et al 2004).

Higher areas in Central Malaita have been identified that would be well suited for the growing of brassica crops. These will have good access to the Auki market with the rehabilitation of the Bursrata

19 See http://www.irc.gov.pg/index.htm

road. The Malaita Province provincial report (see Volume 4, Chapter 6) notes temperate vegetables and fruit that could be successfully grown at higher altitude locations on Malaita, including potatoes, round cabbages, carrots, tomatoes and strawberries. To help introduce them into Malaita, the report recommends propagating and distributing planting material for a number of species and providing advice to growers on how to grow and market the produce.

5.5 RECOMMENDATIONS

As a result of the issues analysed above, a number of recommendations are made to help the expansion of the fresh produce industry.

- Urban and provincial markets should be upgraded. This needs to be done in close collaboration with municipal and provincial authorities and in coordination with other donors who are also considering participation in this area.
- Marketing information should be provided. On a weekly basis, basic price information and shipping cost information should be collected from the Honiara market (later to include other main provincial markets). This information should be processed and disseminated within 24 hours using the Solomon Islands Broadcasting Commission.
- Improved fruit and vegetable planting material should be propagated and distributed. Where possible, this planting material would be sourced domestically. However, it will be necessary to import some material. Appendix 3.5 describes how quarantine issues might best be handled.
- There should be support for a program of on-farm trials for new improved planting material (see Appendix 3.4).
- People with horticultural technical expertise should work with DAL and appropriate NGOs.
- Roads should be rehabilitated and upgraded. Initial emphasis should be on road rehabilitation on Malaita through the existing Community Peace and Restoration Fund (CPRF) road program. It is suggested that a basic pool of second-hand machinery[20] should be supplied to the CPRF Malaita community-based road program.

20 The pool of equipment proposed is one grader, one loader, one roller, four tipper trucks and possibly one dozer. If good-quality, used equipment is purchased, the estimated cost is A$800 000 (Ken Monroe, Ministry of Infrastructure, pers comm, November 2005)

6 Rice

6.1 HIGH RICE CONSUMPTION AND IMPORTS

Rice consumption per capita in Solomon Islands (SI) is among the highest in the Pacific Islands (see Table 6.1). Solomon Islanders consume more rice per head than Fiji Islanders and significantly more rice than the average Papua New Guinean. However, they consume less rice per head than the average Ni-Vanuatuan. Vanuatu is the only Melanesian country that has not promoted the development of a domestic rice industry.

Virtually all rice consumed in SI is imported (averaging around 23 000–24 000 tonnes over the past six years). For the year ending 30 April 2004, the landed value of these imports was around $79 million (see Table 6.1).

Rice imports have remained constant over the past few years, and thus consumption per head has fallen in the face of a rapidly growing population. Falling per capita consumption is the result of both income and price effects. There has been a decline in real disposable income over the past decade. With the depreciation in the value of the domestic currency, the price of imported rice has increased sharply relative to locally grown substitutes, such as sweet potatoes. The exchange rate of the SI dollar against the US dollar has halved since 1997 (from 3.8 in 1997 to 7.5 in 2003).

Table 6.1 Rice consumption, production and imports for selected Pacific Island countries

	RICE CONSUMPTION (TONNES)	LOCAL PRODUCTION (TONNES)	IMPORTS (TONNES)	POPULATION	PER CAPITA CONSUMPTION (KG/YEAR)
Solomon Islands	23 600	100	23 500	415 000	57
PNG[a]	150 400	400	150 00	5 500 000	27
Fiji[b]	45 000	15 000	30 000	881 000	51
Samoa[c]	4500	–	4 500	178 000	25
Vanuatu[d]	13 000	–	13 000	203 000	64

a ADB 2004

b MASLR Annual Reports, Bureau of Statistics, Trade Reports

c FAO ESSA July 2004

d FAO ESSA July 2004

6.2 POOR DOMESTIC PRODUCTION PERFORMANCE

The high level of rice imports has raised concerns about foreign exchange leakages and food security vulnerability. Self-sufficiency in rice production has been a policy priority since the early 1960s when Guadalcanal Plain Limited (GPL) was formed to grow rice as a mechanised plantation crop. A major expansion in Guadalcanal rice growing occurred in 1978 with the creation of Solrice, a joint venture between C. Brewer Corporation (a Hawaiian-based agribusiness) and the SI Government. Around 1000 hectares of rice were planted on some of the country's best land. C. Brewer withdrew from the joint venture after four years of successive losses (ADB 1998). With serious insect problems and highly mechanised production practices that yielded well below projections, the enterprise was unlikely to succeed financially. Hence, there was little incentive to re-establish Solrice's plantation after the destruction wrought by Cyclone Namu in 1985.

Domestic rice production has again become a government priority, with the focus now shifting to village-level production throughout SI. The Republic of China (ROC/Taiwan) has taken a lead role in the rice development program through technical assistance and generous financial support to the Department of Agriculture and Livestock (DAL) and farmers.

The findings of the provincial reports (see Volume 4) suggest that this smallholder rice development program is unlikely to be any more sustainable than past broadacre rice ventures have been. There has been a pattern of low yields, a dependency on subsidised imported inputs, subsidised extension services, and major pest and disease problems.

6.2.1 MALAITA

Some rice is being grown on Malaita. There are seven rice mills in the province, although the current state of repair is uncertain. It is claimed that there are 73 hectares under rice cultivation, although the actual figure is likely to be much less. Production in 2004 is likely to be about 10 tonnes — a minute fraction of sweet potato and other staple food crops.

Rice production in Malaita is primarily the result of development assistance programs run by the ROC, which provide support through direct agricultural extension services and the provision of training, tools, fertilisers, herbicides, pesticides and milling machines. The most common method of cultivation in the province is dryland farming, and the growing season coincides with the wettest months of the year. Output is generally used for subsistence purposes or seed stock, with only a small proportion sold locally.

Except for some support for the Taiwan-funded rice plots, DAL staff provide no support for agriculture in the province. Technical assistance is given to rice growers and funds are used for travel. Staff will visit villagers only if they are paid a travel allowance; this is not available, so, except for the rice adviser, staff do not travel to villages.

The local rice crop is increasingly subject to insect attack. Dependence on chemical, mechanical and external technical inputs means that most rice projects in Malaita fail soon after the end of the standard two-year period of support provided by Taiwan. For several years, substantial resources have been directed at increasing rice production in Malaita, without any significant or demonstrable success. Future resources and efforts would be better spent focusing on other commercial and subsistence crops in the province.

6.2.2 TEMOTU

Rice is becoming an important food in most rural households in Temotu. Smallholder rice growing is being promoted in Temotu under the ROC Agriculture Technical Mission; however, production is heavily subsidised. Assistance to villagers takes the form of direct funds for technical support from agricultural extension staff, equipment, seed, fertiliser, chemicals and milling machinery. Two rice mills have been installed in Temotu but neither is fully used. One requires repair work, and the other was installed under private arrangements, rather than through the DAL extension arrangements. The area in which it is located is no longer producing enough rice for the mill to be fully used. The ROC Agriculture Technical Mission required rice production to occur in a 20-hectare area for supply

of the rice mill. This condition is difficult to meet and is a disincentive to most farmers. Currently, two additional rice mills are needed — on Reef Islands and Bekapoa (north coast of Santa Cruz). Here, rice is generally consumed within the producing households and surplus is sold locally. The rice crop is increasingly subject to insect attack, especially during growth of the second and third crops. The dependence on external inputs (chemical, mechanical and technical inputs) makes it difficult for most smallholder rice growers in Temotu to sustain production. Substantial resources have been directed at rice production for the past six years.

6.2.3 CENTRAL PROVINCE

The ROC Agricultural Mission introduced rice cultivation to Central Province in the early 1990s. Funding support was given to agricultural extension staff, and farmers were provided with seeds, fertilisers, pesticides and tools. Two rice milling machines were installed, one at Tulagi and one on Savo. It has been reported (see Volume 4, Chapter 1) that more than 20 farmers were cultivating rice in the late 1990s. According to provincial agricultural extension staff, this number has now declined to 10 farmers or fewer. The small quantity of rice that is still being produced is milled for household consumption. Extension staff believe that the province does not have enough flat land to support rice cultivation and that farmers cannot meet the ongoing costs of pesticides and fertilisers. Pest and disease problems are also a major constraint.

6.2.4 CHOISEUL

Interest in rice has been relatively short-lived in Choiseul Province. There is still a small amount of rice production in the Panggoe region, heavily supported by the ROC and the agricultural extension service. Approximately four tonnes of rice were produced last year and taken to Honiara for milling. Given the labour, seed, fertiliser, insecticide and milling inputs required, rice production in Choiseul is unlikely to be viable in the long term once the ROC subsidies are removed.

6.2.5 ISABEL

Rice is becoming an important food in most rural households in Isabel Province, and the ROC Agriculture Technical Mission is promoting smallholder rice growing. However, production is heavily subsidised, for example by direct funds for agricultural extension staff visits, equipment and seed, fertiliser, chemicals and milling machinery. Rice mills in Isabel are located at Buala and Kaevanga. The rice is generally consumed within the producing households and surplus is sold locally. The rice crop is increasingly subject to insect attack, especially during growth of the second and third crops. The dependence on external resources (chemical, mechanical and technical inputs) makes it difficult for most smallholder rice growers in Isabel to sustain their production. Substantial resources have been provided for rice production for the past six years.

The Isabel Development Authority (IDA), the business arm of the Isabel Provincial Government, operates an 8.7-hectare commercial rice farm at Garanga with ROC assistance (provision of $20 000 in operating capital, fertiliser, chemicals and a threshing machine). This farm is the only fully operational commercial rice farm in the country. However, it is running at a loss because of low yields (1 tonne/hectare) and high labour costs. The management has scaled down operations to a few rice blocks and most of the remaining areas have reverted to bush.

6.2.6 MAKIRA

Rice is becoming an important food in most rural households in Makira, and the ROC Agriculture Technical Mission is promoting smallholder rice growing. However, production is heavily subsidised by external resources. Assistance to villagers takes the form of direct funds for technical support from agricultural extension staff, equipment, seed, fertiliser, chemicals and milling machinery. Three rice mills are currently operating in Makira. The rice is generally consumed within the producing households and surplus is sold locally. The rice crop is increasingly subject to insect attack, especially during the growth of the second and third crops. The dependence on external resources (chemical,

mechanical and technical inputs) makes it difficult for most smallholder rice growers in Makira to sustain their production. Substantial resources have been directed at rice production for the past six years. It is claimed that there are 30 hectares under rice cultivation, although the actual figure is likely to be much less, as many fields are fallow or produce rotational crops.

DAL claims that about 1000 tonnes of rice is grown in SI each year. The figures that the author's study team gathered in the field in 2004 indicate that actual production may be as low as 30–50 tonnes, and is certainly no more than 100 tonnes for the entire country.

6.3 INCORRECT PREMISES FOR DOMESTIC RICE PRODUCTION PRIORITIES

The priority given to local rice production is based on two premises. The first is that high levels of grain imports are a good indicator of a low level of food security. The second is that the most appropriate way to reduce the foreign exchange drain from importing rice is to produce rice. The following sections explain why, in the context of SI, these premises are incorrect.

6.3.1 HIGH RICE IMPORTS ARE NOT A GOOD INDICATOR OF FOOD INSECURITY FOR SOLOMON ISLANDS

Despite a high level of rice imports, SI has a relatively favourable food security status. People have adequate food security when households have the capacity to access sufficient food at all times, either through producing it themselves or through buying it. Rural communities in SI meet their caloric needs by growing staples (particularly sweet potato) and producing export commodities (copra and cocoa) that provide the cash to purchase food (particularly rice). Most rural people have access to land and can grow most of their food requirements, which they supplement with food purchased with the proceeds of the sale of cash crops.

The reasonable food security situation could be improved by:

- increasing the productivity of existing staple crops
- increasing the income generated from the sale of cash crops
- introducing new staple food crops, such as rice.

A focus on the first two options is likely to be much more productive than a focus on the third option.

6.3.2 GROWING RICE IS NOT THE MOST APPROPRIATE WAY TO REDUCE FOREIGN EXCHANGE LEAKAGES FROM IMPORTING RICE

Approximately $80 million is spent annually on importing rice. To put this amount in perspective, the value of coconut product exports seldom exceeds $40 million. The policy response of the SI Government to this large foreign exchange leakage has been to encourage the local production of rice. This has also been the policy approach taken by the governments of Fiji and Papua New Guinea.

An alternative approach to reduce rice imports would have been to encourage the increased substitution of other locally grown staples. This approach has been occurring as an indirect consequence of the marked depreciation in the value of the local currency. In terms of comparative advantage (economic efficiency), encouraging locally grown staples is a much more appropriate policy response.

Increasing local rice production would be economically efficient if more foreign exchange was saved than the foreign exchange cost of producing the additional rice. Unfortunately, there have not been any quantitative studies on the economic efficiency of rice production in SI. While such research is a priority for agricultural policy formulation, it is well beyond the resources available for the author's study. Suitable research would most probably show that rice growing in SI is an inefficient industry, costing much more than the value of the foreign exchange it saves (domestic resource cost ratio > 1). Such a result would be the consequence of low yields, heavy reliance on imported fertiliser and chemicals purchased, and high subsidies.

In contrast, there is considerable potential for significant import substitution via increased production of traditional staples. A small increase in the production of traditional staples for each household translates as a major increase in import substitution at the national level. For example, a 5% increase in sweet potato production would result in an additional 14 000 tonnes of sweet potato per year. This production would be the equivalent 4200 tonnes of imported rice, representing a foreign exchange saving of around $14 million.

The most efficient way to increase production of the staple food crops is through the adoption of superior varieties. The introduction of these varieties has very little foreign exchange cost and is likely to be highly economically efficient.

Smallholder rice production requires substantial labour input (around 70 person-days to produce one tonne of rice, with much backbreaking work). Table 6.2 shows typical labour inputs for one hectare of traditional dryland rice production in Fiji. If yields are low, as they are in SI, then the returns to labour are correspondingly low. It remains to be seen whether growers will sustain their interest once the high levels of assistance on offer are withdrawn. However, the experience across SI to date has not been encouraging.

Table 6.2 Typical labour inputs for one hectare of traditional dryland rice production in Fiji

ACTIVITY	LABOUR INPUT (PERSON-DAYS)
Land preparation	36
Broadcasting	1
Fertiliser application	1
Spraying	2
Harvesting	10
Threshing	12
Winnowing	6
Labour for cartage	2

Source: Prasad (1999)

Undoubtedly, farmers would be willing to devote more effort to rice production if prices were significantly higher. An increase in prices could probably be achieved only through substantial protection that allowed for significant increases in consumer prices. Given that rice is the most important staple food for all communities in SI, the required level of protection would heavily discriminate against consumers in both rural and urban areas. Such a level of protection would thus seriously undermine food security. Another option is to use taxpayer funds to support rice prices and subsidise inputs. This inefficient use of resources is unlikely, given the government's precarious economic position.

6.4 SUGGESTED INTERVENTIONS TO ASSIST RICE POLICY FORMULATION

To improve agricultural policy formulation for rice production, there is a need for a comprehensive study on the comparative advantage of rice and other staple food crop production in SI.

7 Indigenous tree nuts

7.1 INTRODUCTION

Solomon Islands (SI) has several species of indigenous tree nuts that play an integral part in the subsistence and food security of SI societies. The introduction of the Proceedings of the South Pacific Indigenous Nuts Workshop, held in 1994, states:

Indigenous nuts are an integral part of the complex arboricultural, agricultural and sociobiological systems that have evolved to suit the diverse biophysical conditions of the south Pacific Islands. Selection, conservation, cultivation and exchange of superior cultivars over thousands of years by Pacific Islanders has produced a wide range of indigenous nut morphotypes, a unique wealth of ethnobotanical knowledge, and strong cultural and spiritual affinities with the crops. Despite the introduction of exotics and a corresponding change in diets, indigenous nuts remain a seasonally important part of rural people's diet. (Evans et al 1996)

As well as being important in the domestic economy, indigenous tree nuts have considerable potential as an export crop, despite the fact that government projects to commercialise indigenous nut production have been largely unsuccessful so far.

Some Pacific Island countries (PICs) have become interested in emulating the successful Hawaiian and Australian macadamia industries. However, the development of a macadamia industry in SI is not recommended. A small new industry would be at a distinct disadvantage against large, established industries in Hawaii, Australia and South Africa.

Moreover, macadamia nuts are not suited to locations that are cyclone prone. It would be better to devote resources to unique indigenous nuts than to invest in an already well-known Australian forest nut. Macadamia nuts have now made the transition from a niche product that is always in short supply to a commodity with more of the characteristics of cashews and almonds.

Table 7.1 lists indigenous nuts of commercial significance found in SI. They are superior products that are the result of the selection, conservation, cultivation and exchange of superior cultivars over thousands of years. The two nuts with significant commercial potential in SI are canarium and cutnuts.

SI would have a genuine comparative advantage if it developed an export industry in indigenous nuts. A huge resource base already exists, as shown below in Table 7.2 for canarium nuts.

Evans (1996) estimated that in 1995 the volume of ngali produced annually in SI was 45 000 tonnes of nut-in-shell (NIS). If just 25% of this quantity were harvested and had a farmgate value of $4/kg, it would represent an industry valued at $45 million. The export value of the oil palm industry at its peak was $94 million.

Table 7.1 Melanesian indigenous nuts with significant commercial potential

GENUS	MAIN SPECIES	STANDARD COMMON NAME	COMMON OR VERNACULAR NAME
Canarium	*indicum*	Canarium nut	Ngali
	salomonese	Canarium nut	Adoa ngali
	harveyi	Canarium nut	Santa Cruz ngali
Barringtonia	*procera*	Cutnut	Cutnut
	edulis	Cutnut	Cutnut
	novae-hiberniae	Cutnut	Bush cutnut
Terminalia	*catappa*	Sea almond	Alite
	kaernbachii	Okari	Bush alite
Inocarpus	*fagifer*	Tahitian chestnut	Ailali

Source: Derived from Evans (1996)

Table 7.2 Estimated resource and annual production of edible *Canarium* spp nuts in western Melanesia

COUNTRY	TOTAL LOWLAND FOREST AREA (MILLION HA)	AREA WITH *CANARIUM* (MILLION HA)	AVERAGE DENSITY OF EDIBLE *CANARIUM* (TREES/HA)	TOTAL NUMBER OF EDIBLE TREES (MILLION TREES)	TOTAL NIS PRODUCTION AT 50 KG/ TREE/YR (TONNES)	TOTAL KIT PRODUCTION AT 15% OF NIS PRODUCTION (TONNES)
PNG	23.0	6.0	0.2	1.0	48 000	7200
Solomon Islands	2.0	1.8	0.5	0.9	45 000	6750
Vanuatu	0.4	0.3	1.0	0.3	15 000	2250
Total	**25.4**	**8.1**		**2.2**	**108 000**	**16 200**

NIS = nuts in shell, KIT = kernels in testa

Source: Evans (1996)

To varying degrees, all indigenous nuts show a number of unique positive characteristics. They:

- are a uniquely Melanesian product
- are a widely distributed and significant resource base
- are easily cultivated trees that could be planted in orchards
- are tolerant of cyclones
- are suitable as a lower-storey tree in multispecies agroforestry
- lack known serious pest constraints
- require low management inputs
- have an excellent 'nutty' taste when correctly processed
- have a long shelf life after processing
- are suitable for initial processing at the village level
- have a particularly good nutritional profile
- have the potential to offer economic opportunities to some of the most economically depressed regions.

7.2 POTENTIAL EXPORT MARKETS

Indigenous nuts could become for SI and Melanesia what the brazil nut is for the Amazon, and the Australian macadamia nut for Hawaii. The target market is high-income consumers, who are prepared to pay a premium for taste, nutrition, 'adventure' and environmental preservation. Before this market can begin to be realised, it is necessary to resolve substantial marketing problems, such as the continuity of supply and quality control.

Tree nuts make up a significant component of the huge growth in world horticultural export trade that has occurred in the past three decades. World trade in tree nuts is well in excess of US$1000 million (McGregor and McGregor 1997). The most important tree nuts are almonds and cashews, with combined exports exceeding 300 000 tonnes. The macadamia nut is the most recent tree nut to enter international trade on any scale. Macadamias represent only about 0.5% of world trade in nuts.

A substantial industry based on Melanesian indigenous nuts would represent an insignificant share of the world trade in nuts; however, the product could have a major marketing advantage. Demand for horticultural commodities is likely to be best for products that have experienced rapid growth in recent years but whose per capita consumption is still low. These are products that have not been exploited anywhere near their market potential. A decade or so ago, macadamias fell into this category. Melanesian nuts will remain in this high-value, narrow-niche market category for the foreseeable future. The promoters of Melanesian nuts will have a product that not only tastes good (if processed and packaged correctly), but also can be targeted at increasingly health conscious and environmentally conscious consumers.

As an undersupplied niche commodity facing highly inelastic demand, Melanesian nuts should be able to command prices at least equivalent to those of macadamias (around 2.5 times that of almonds), provided equivalent quality and packaging standards are achieved, and provided there is the necessary level of promotion. Because of the volume and costs involved, the target must be the top end of the market.

There is a growing market for products that are perceived to contribute to environmental and cultural sustainability. Pacific Nuts Ltd in Santo Vanuatu obtained organic certification for its nangai nut (ngali) suppliers. The marketing of indigenous nuts in Melanesia also stands to benefit from the introduction of a nontimber forest product certification system currently being developed by the Forest Stewardship Council.

The meteoric growth in trade through the internet provides increasing opportunities for high-value exotic products from more remote locations. The internet offers the opportunity for direct retail trade in packaged products to remote consumers without major investment in promotion and marketing. This technological innovation heralds a major reversal in the way markets are developed, which can level the playing field in favour of small countries.

7.3 THE DOMESTIC MARKET

For the foreseeable future, most nuts will be sold locally, where there are substantial, undersupplied markets. In addition to traditional subsistence consumption, the following market opportunities have been identified:

- municipal markets, because rapid rural–urban drift has created a commercial demand for traditional delicacies associated with 'home'
- higher-income consumers, who are willing to pay a premium for packaged nuts that offer accessibility, convenience and availability outside the traditional season
- hotels and airlines, which offer a steady market for speciality nuts, although this market is yet to be developed
- tourists, who provide a huge potential market for speciality products, as the Hawaiian experience has shown; tourists visiting the South Pacific are often frustrated by the lack of conveniently and attractively packaged products they can take home.

Nut specialist Barry Evans estimated the potential commercial urban retail market for simply packaged ngali nuts in SI to be worth $250 000 per year (5000 kg of kernels at approximately $50/kg); worth $66 000 at the farmgate (33 tonnes of NIS at $2000/tonne) (see the Western Province provincial report, Volume 4, Chapter 9). However, this is a conservative estimate: the combined markets in neighbouring Papua New Guinea (PNG) and Vanuatu are estimated to be worth at least four times the value of the SI domestic market; that is, $1 million per year (20 000 kg of kernels), worth $0.25 million per year at the farmgate.

7.4 INDIGENOUS NUT DEVELOPMENTS TO DATE

Efforts to commercialise indigenous nuts are not new. During the season, substantial volumes of ngali nuts are traded on the Honiara, Gizo and Auki markets and elsewhere. Green cutnuts are also traded. No estimates are available on the volume of this trade, although it is likely to be significant.

As noted above, government projects to commercialise indigenous nut production have not been very successful. The Ministry of Agriculture and Fisheries (MAF) initiated a ngali nut project in 1988. The MAF conducts research and development at the Dodo Creek Research Station (DCRS), with marketing conducted by the Commodities Export Marketing Authority (CEMA). Peleomo et al (1994) summarise the operational relationship between the two bodies as shown below in Figure 7.1.

Nut grower collects and dries fallen nuts

▼

Grower or trader sells to CEMA buying centre

▼

CEMA ships NIS to Honiara for cracking (by hand) by DCRS

▼

DCRS sends the packaged product to CEMA to sell to consumers and retailers

Figure 7.1 Ngali marketing arrangements

In 1989, CEMA purchased around 270 tonnes of ngali NIS for sale to DCRS for commercial processing. DCRS's cottage-scale roasting, vacuum-sealing operation has not been able to achieve the scale and quality requirements needed to be commercially viable (Donga 1996), so less than half the nuts were used. In 1993, CEMA entered into an agreement with Body Shop International (BSI) to supply ngali nut oil to be used in a 'nonsun' tanning lotion. BSI ceased buying in 1995 because of continual problems with the quality of oil produced at the DCRS (microbial contamination, free fatty acid contamination, and rust contamination).

Nongovernment organisation (NGO) experience in SI has been more encouraging. In 1992, the Solomon Islands Development Trust commenced a ngali nut oil project on Makira, with support from Conservation International. In 1994, the first shipment of 200 litres of oil produced by villages using a screw press was sent to Australia as a speciality ingredient for personal care products. The same project is now selling ngali kernel oil to Australia as an ingredient in patented herbal medicines.

Despite these efforts, indigenous nuts in SI remain little more than a subsistence industry — albeit an important one. The missing ingredient in the commercial development of indigenous nuts has been private sector involvement. The active involvement of the private sector will be critical for any sustainable industry development. This is borne out by the fact that Vanuatu has achieved the greatest success in the commercial development of Melanesian nuts, despite having the smallest resource base. This success is attributed to active entrepreneurial involvement in the industry. Santo-based Pacific Nuts Ltd exports ngali nut kernels to France, where they are used as an exotic ingredient for premium-quality bakery and confectionery products. The Port Vila-based Kava Store ships small quantities of dehydrated ngali and cutnut kernel to Japan and New Caledonia.[21] The Kava Store sells significant quantities of nuts packaged in traditional baskets to tourists. Vanuatu has also begun to establish tree nut orchards.

21 The Kava Store's core business is trading in kava. Profits from kava have been used to develop the processing and marketing of nuts and other local products. In 1989, the Kava Store began buying, processing and selling nangai (ngali), navele (cutnut), and natopoa (talia).

Table 7.3 Main elements of the models used to calculate smallholder financial returns

MODEL	SOURCE OF NUTS	METHOD OF SALE	DETAILS OF FINANCIAL ANALYSIS
Ngali nuts			
Model 1	Nuts gathered from existing trees	Dried nuts sold to middleman	Table 7.4
Model 2	As above	Dried nuts sold to processor	Table 7.5
Model 3	Nuts planted in a 1 ha orchard	Dried nuts sold to middleman	Appendix 3.6
Cutnuts			
Model 4	Nuts harvested from existing trees	Dried nuts sold to middleman	Table 7.6

Table 7.4 Enterprise model 1 (ngali nuts gathered from existing trees, dried and sold to a middleman)

PRODUCTION	
Number of trees	25
Fresh fruit/tree (kg)	125
Yield/tree (kg NIS)	50
Price at Gizo ($/kg NIS)	1.4
Total (kg NIS)	1 250
Revenue ($)	**1 750**
Costs ($)	
Transportation to Gizo ($8 per 80 kg bag)	125
Net revenue ($)	**1 625**
FAMILY LABOUR (PERSON-DAYS)	
Gathering and piling nuts (assumes 100 kg of fruit/person/day)	31
Removing fruit from nuts (assumes 200 kg of fruit/person/day)	15
Drying	2
Bagging and cartage	1
Total	49
Return per day of labour ($)	**33.2**

NIS = nut-in-shell

7.5 FINANCIAL RETURNS

The authors have used four alternative smallholder enterprise models to examine the returns to land and labour from nut production. Table 7.3 shows the main elements of each. Tables 7.4, 7.5, 7.6 and Appendix 3.6 show the results of the modelling. In general terms, the models deal with three different ways of harvesting and marketing ngali nuts and one way of harvesting and marketing cutnuts.

7.5.1 ENTERPRISE MODEL 1 (NGALI NUTS GATHERED FROM EXISTING TREES, DRIED AND SOLD TO A MIDDLEMAN)

This model is based on the situation of a nut tree-owning household located in the Western Province, which on-sells to an agent (see Table 7.4). The model assumes that the household has access to 25 trees. Each tree is assumed to yield 50 kg NIS/tree/year (Evans 1996). The fruit are gathered from the ground and piled in heaps. For scattered 'wild'

Table 7.5 Enterprise model 2 (ngali nuts gathered from existing trees, dried and sold to a processor in Honiara)

PRODUCTION	
Number of trees	25
Fresh fruit/tree (kg)	125
Yield/tree (kg NIS)	50
Price at Honiara ($/kg NIS)	2.8
Total (kg NIS)	1 250
Revenue ($)	3 500
Costs ($)	
Transportation to Honiara ($20 per 80 kg bag plus $120 passage)	433
Net revenue	3 068
Family labour (person-days)	
Gathering and piling nuts (assumes 100 kg of fruit/person/day)	31
Removing fruit from nuts (assumes 200 kg of fruit/person/day)	15
Drying	2
Bagging and cartage	1
Marketing time (travel to Honiara)	4
Total	53
Return per day of labour ($)	**57.9**

NIS = nut-in-shell

trees, this activity requires a considerable amount of labour. Using the calculations of Evans (1994b) for West New Britain, PNG, it is estimated that one person can gather 100 kg of fruit in a day. The fruit is then allowed to ferment for several days before the fleshy mesocarp is washed off. Again, this is a labour-intensive activity: it is estimated that one person can wash 200 kg of fruit in one day. The NIS is air-dried on slatted bamboo racks for two to three weeks in an open-sided house with a sago-thatch roof. The dried NIS is sold to the agent at a price of $1.40/kg at Gizo. This low-labour input enterprise generates a return to effort of $33 per person-day. The results are sensitive to the amount of time it takes to gather fruit and to remove fruit from the nut. A household with access to a relatively dense grove of productive ngali trees could double this rate of return. The rate of return could also be greater for families with access to trees with a high ratio of kernels to nuts, as discussed in model 2, below.

7.5.2 ENTERPRISE MODEL 2 (NGALI NUTS GATHERED FROM EXISTING TREES, DRIED AND SOLD TO A PROCESSOR IN HONIARA)

In model 2, the tree owner takes dried NIS to Honiara for direct sale to a potential processor. The price received doubles to $2.80/kg. However, because of the high cost of shipping a relatively small volume, there is less than a two-fold increase in the returns to effort (see Table 7.5). The sale of nuts should be seen in the context of helping to finance a multipurpose trip to Honiara.

For both model 1 and model 2, the financial returns could be substantially increased for a household with access to a productive grove of ngali trees with a high ratio of kernels (K) to nuts (N). This is because a higher K:N ratio means that more kernels can be obtained from the same cracking effort. Surveys undertaken in Vanuatu found that the percentage of kernel to NIS ranged from 9.7% to 21.8% (average 15.7%).

7.5.3 ENTERPRISE MODEL 3 (NGALI NUT ORCHARD ESTABLISHED; NUTS GATHERED, DRIED AND SOLD TO A MIDDLEMAN)

In model 3, a farmer plants a one-hectare orchard of ngali nuts. The ngali are initially planted four metres from each other, with approximately 625 trees in total. After seven years, 33% of the trees are culled out; at year 10, 50% of the remaining trees are removed. The mature ngali plantation has approximately 200 trees, seven metres apart. When bush is cleared to plant ngali, some trees would have to be left to provide shade for young ngali trees. These trees would be cleared at around year 5. Based on the work of Evans (1994b) for West New Britain, it is assumed that some trees (5%) commence flowering in year 5 and reach full flowering in year 10 (95% of trees). Yield estimates are the same as those used by Evans in the West New Britain 1-hectare plantation model. The dried NIS nuts are sold to an agent for $1.40/kg.

Based on Evans (1994b), a linear growth rate of 1 m/year is assumed for tree height and 2 cm/year for diameter at breast height (dbh). Therefore, at the first culling, the trees will be approximately seven metres tall, with a dbh of 14 cm. It is assumed that these cullings will only be used for firewood, for which a notional value of $2 per cubic metre is applied. At the time of the second culling at 10 years, the trees will be 10 metres tall with a dbh of 20 cm. These trees will be large enough to produce round logs for posts. This hardwood will require treatment, so there will probably be a limited local market, given that fencing timber is usually readily available in the bush. However, exporting could be viable if a sufficient volume of posts is available from ngali plantations. A stumpage price of $100 per cubic metre is assumed. At 25 years, the trees could be cut for sawn timber; however, it is assumed that the household retains the trees for their nut income and they are not cut.

Over the 25-year period, the ngali nut orchard generates a cash income of around $200 000. The present net value of this income, at an interest rate of 8%, is $43 800. The average annual gross margin per hectare is $8100. The average annual labour input is 128 person-days, which yields a return per family-day of $63. For comparison, an equivalent enterprise would be the planting of one hectare of coconuts. The returns from ngali nuts are more than favourable in terms of returns to both land and labour. An alternative could be to plant ngali under established coconuts. This would substantially reduce the cost of clearing, with the coconuts providing shade for the young ngali trees. Additional returns would also be produced by the copra.

Appendix 3.6 provides a detailed financial analysis of model 3 over 25 years.

7.5.4 ENTERPRISE MODEL 4 (CUTNUTS HARVESTED, DRIED AND SOLD TO A MIDDLEMAN)

In model 4, a village household harvests cutnuts, dries them and sells them to a middleman. Table 7.6 lists the characteristics of cutnuts harvested in SI, while Table 7.7 provides details of model 4.

Table 7.6 Characteristics of cutnuts farmed in Solomon Islands

SPECIES	FRUIT PER MATURE TREE (KG)	FRUIT WEIGHT (G)	KIT (GREEN) WT	KIT/FRUIT (%)	K:NIS RATIO (%)	ESTIMATED TREE YIELD (KG KIT)	EASE OF OPENING FRUIT	VARIATION IN FRUIT SIZE
Barringtonia procera	10–50	61	5.5	9.0	9.0	1.0–5.0	Easy	Medium
B. edulis	10–50	99	5.0	5.0	4.5	0.5–2.5	Easy	Medium
B. novae-hibeniae	10–50	91	3.7	4.0	3.9	0.5–2.0	Easy	Medium

KIT = kernels in testa, NIS = nuts in shell

Source: Evans (1996)

Table 7.7 Enterprise model 4 (cutnuts harvested, dried and sold to a middleman)

PRODUCTION	
Number of trees	200
Yield (kg fruit/tree)	40
Yield (kg sun-dried NIS/tree)	3
Selling price ($)	2
Total (kg NIS)	600
Revenue ($)	1 200
Costs ($)	
Transportation to buyer ($14/50 kg bag)	168
Net revenue ($)	1 032
Family labour (person-days)	
Harvesting and piling	40
Peeling	10
Drying	5
Baggage and cartage	1
Total	56
Return per day of labour ($)	**18**

Note: It is assumed that the household has access to 200 trees, which yield 40 kg of fruit and 3 kg of nuts in shell (NIS) per tree. This estimate of yield is an approximation based on the data in Evans (1994b) for the three varieties of cutnut, found in SI.

The fruit is harvested from the trees approximately one month before maturity (Kava Store recommendation). Ideally, the fleshy mesocarp should be removed using a knife immediately after collection. However, it is more likely the fruits will be piled and maggots allowed to remove the flesh with no apparent ill-effects on the nuts. The sun drying takes 8–15 days, depending on the weather conditions; drying too quickly causes the kernel to harden (Charles Long Wah, Kava Store, Vanuatu, pers comm, 1996).[22] The sun-dried NIS is sold to the middleman for $2/kg.

The semiprocessing of cutnuts requires more labour from the household than is needed for ngali nuts. The fruit weighs about three times as much as ngali. Also, the fruit must be harvested from the tree rather than collected from the ground, as is the case with ngali. Thus it is assumed that one person harvests 200 kg of ngali fruit in a day (compared with 100 kg in the ngali model). The model also allows more labour input for drying because of the greater time involved. The return per person-day from this activity is estimated at about $18. This is less than the equivalent ngali model, which earns around $33/day.

Table 7.8 Summary of estimated financial returns to growers from alternative indigenous nut enterprises

ENTERPRISE	RETURNS TO EFFORT ($/DAY)	RETURNS TO LAND ($/HA)
Model 1 (ngali nuts gathered from existing trees, dried and sold to a middleman)	33	NA
Model 2 (ngali nuts gathered from existing trees, dried and sold to a processor in Honiara)	58	NA
Model 3 (ngali nut orchard established; nuts gathered, dried and sold to a middleman)	63	8 100
Model 4 (cutnuts harvested, dried and sold to a middleman)	18	NA
Comparators		
Copra (planting 2 hectares of local talls)	16	316
Cocoa (planting 1 hectare)	30	834

NA = not applicable (nuts are gathered on land used primarily for other purposes)

22 When properly dried, the kernel should be slightly yellow.

Comparison of models

The results of the various models are summarised in Table 7.8. The returns for alternative indigenous nut enterprise models are more than those earned from cocoa, and considerably more than those from copra.

7.6 REALISING MARKET POTENTIAL

Any major development of the indigenous tree nut industry will require investment on a scale similar to that in the oil palm industry in recent decades. The end result could well be an industry of equivalent importance. Like oil palm, the nucleus enterprise model[23] is highly appropriate for the development of an indigenous nut industry. A central processing and packaging facility would be required for any significant marketing. Smallholders could be supplied with credit, extension services and other inputs without fearing that they would bypass the central enterprise providing these facilities.

Despite their inherent quality, indigenous nuts are largely unknown outside Melanesia. Therefore, there will be a need to allocate major resources to both product and market development, and the experience of the Hawaiian macadamia nut industry is relevant (McGregor 1994). Macadamia nuts were introduced into Hawaii from Australia in the 1880s; however, the commercial development of the industry did not occur until after World War II, with large-scale investment by Castle and Cooke Inc. The industry, now valued at more than US$200 million, was built on vigorous agribusiness participation. Mauna Loa Macadamia Nut Corporation, the world's largest macadamia nut company, established a marketing organisation for the distribution of a full range of macadamia nut products under its own brand name. Since the 1980s, the corporate emphasis has shifted from production to marketing and promotion. During this period, the industry grew substantially, and Mauna Loa has spent more than US$20 million on advertising alone.

The Hawaiian macadamia nut industry depended on the injection of substantial equity and risk capital. There is no such capital available for a new agribusiness venture in SI.

Until such investment is forthcoming, there are opportunities for a much smaller-scale development along the lines of the Kava Store in Vanuatu. However, there are constraints even for small-scale commercial development.

The hardness of the ngali nut shell poses one major constraint. An enterprise in Vanuatu, Pacific Nuts Ltd, successfully overcame this by using a modified walnut cracker. USAID's Pacific Island Commercial Agricultural Development project has developed a prototype based on a macadamia nut cracker that is used by the Kava Store (Gautz 1994).

Another requirement is the need to develop and refine basic processing techniques. In this respect, the Kava Store in Vanuatu is willing to share information with other Pacific Island processors. The techniques that the Kava Store has developed for processing cutnuts are particularly innovative, and could be adapted for use by isolated communities in SI. Until now, cutnuts have been sold green but they have a very limited season and an even shorter shelf life. When processed using the Kava Store technique, the quality of cutnuts is equivalent to that of macadamia nuts or almonds. Cutnuts are less delicate than processed ngali nuts, making postharvest handling much easier. There is a substantial cutnut resource on the Guadalcanal Weather Coast, and processing and packaging these nuts for the local market could be a worthwhile micro-enterprise.

Perhaps the largest market opportunities for Melanesian nuts lie in Europe. However, as a new product entering the European market, they are subject to the European Union's (EU) Novel Food Regulation (NFR). Under this regulation, any food first imported into the EU after 1997 has to show that it is not deleterious to health. This was largely a response to genetically engineered products.

23 A nucleus enterprise is defined as a commercial agroindustry entity that has access to markets, technology and production inputs, as well as the management skills and financial resources required to extend this access to associated smallholders. The nucleus enterprise is often a commercial agroprocessing entity but can also be some other type of agroindustry entity that incorporates the above features. The chief motivation for the nucleus enterprise is to formally associate with, and extend support services and production inputs to, smallholders. This is done to obtain a larger and more reliable supply of higher-quality raw materials or semifinished products for its markets.

Unfortunately, compliance is expensive and time consuming. SI, along with other PICs, needs to make diplomatic representation to the EU seeking flexibility in the application of the NFR to natural indigenous products from the South Pacific. Such products include indigenous nuts and noni (*Morinda citrifolia*).

7.7 RECOMMENDATIONS

The development of an indigenous nut industry has the following key requirements:

- recognition at the national policy level of the unique and substantial economic opportunity offered by indigenous nuts
- the inclusion of nuts in SI trade and investment promotion efforts
- diplomatic representation to the EU on the NFR
- the development of appropriate handling techniques for fresh nuts
- continued identification of superior propagation material for cloning
- continued evaluation of planting material for commercial cultivation
- continued development of appropriate harvesting and processing techniques
- the development of appropriate packaging for fresh and processed nuts
- general agronomic research for establishing nut orchards.

8 Vanilla

8.1 INTRODUCTION

The vanilla 'fever' that gripped Papua New Guinea (PNG) in recent years has spread to Solomon Islands (SI). Between 2000 and 2004, PNG moved from producing virtually no vanilla to being the world's third-largest producer. Such meteoric industry growth is unprecedented in Pacific Island agriculture, and it created expectations of a diversification industry rivalling the importance of coffee, cocoa or even oil palm. Thus, it is hardly surprising that there is keen interest in planting vanilla in SI.

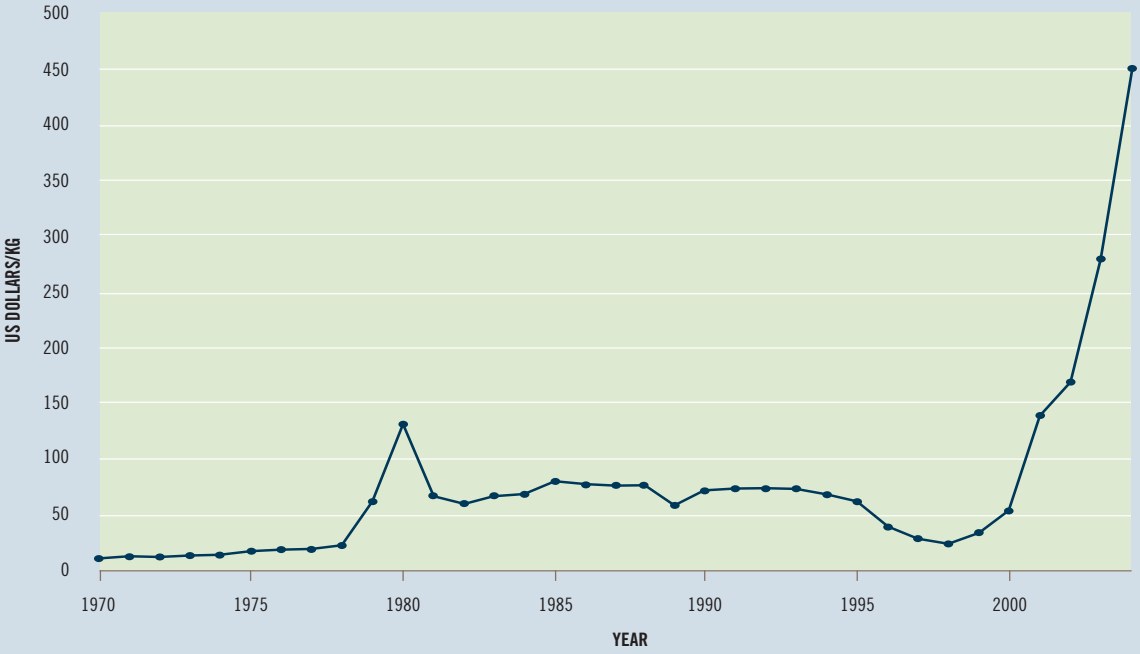
Vanilla is successfully grown from sea level to 600 metres. The crop thrives in hot, moist, insular climates, with frequent, but not excessive, rain. The optimal temperature is 21–32°C, with an average around 27°C. Rainfall should be 1700–2500 mm, and evenly distributed. However, two drier months (with precipitation considerably lower than evaporation) are required to check vegetative growth and to induce flowering. A distinctly cooler period, with temperatures down towards 20°C, will help induce flowering. The stress requirements to induce flowering in *Vanilla planifolia* are greater than for *V. tahitensis*. The crop's ecological requirements significantly limit the locations in which vanilla consistently flowers. In PNG, extensive planting has occurred well beyond these limits. The hot, wet, tropical conditions that prevail throughout most of SI make it unsuitable for successful vanilla production except in North Guadalcanal, which has a distinct dry season.

Vanilla production is labour intensive and well suited to smallholder households. It is rare to find vanilla being successfully grown on plantations. The distinctive flavour and fragrance of vanilla is developed by a slow curing process. Vanilla curing is an enzymatic (not a drying) process that results in the development of glucose and vanillin. Using traditional labour-intensive methods, this curing process takes three to six months to complete. Given vanilla's price volatility, the extended time lapse between pollination and finished product creates considerable risk for the curers and marketers of vanilla. In most significant vanilla-producing countries, curing is undertaken by specialist entities, rather than by farmers.

8.2 THE MARKET

The world market for vanilla is a very small niche market. Total world consumption is only around 2500 tonnes, depending on price and availability. Over the past 20 years, world consumption has oscillated between 1800 and 3000 tonnes, with vanilla production varying between 1200 and 4000 tonnes. Natural vanilla is in direct competition with synthetic sources of vanillin that cost a fraction of the price of the natural product. World demand and supply for natural vanilla is highly concentrated. The United States (US) accounts for around 60% of world consumption. France and Germany also constitute major markets. Madagascar dominates world supply, with a market share ranging from 60% to 75% over the past 15 years.

Figure 8.1 World vanilla prices, 1970–2004[a]



Sources: USDA US Spice Trade Foreign Agriculture Service (1970–88) USDA 'Tropical Products: World Markets and Trade' (1989–94); Public Ledger (1995–2004)

[a] April New York spot price.

The narrow world vanilla market is characterised by extreme price fluctuations, made up of high price peaks and prolonged troughs of relatively low prices (see Figure 8.1). This price pattern is characteristic of the classical 'cobweb' price formation model. Prices have been particularly sensitive to events in a single country — Madagascar.

The recent vanilla price episode has been particularly extreme. A major cyclone in Madagascar in the early 2000s triggered a rapid escalation in world vanilla prices. High prices were sustained by a combination of:

- a civil war (2001–02) that delayed the rehabilitation of the Madagascar industry
- the launch of 'Vanilla' Coke, which increased demand
- another cyclone that damaged Madagascar's vanilla-growing areas in early 2004
- speculative demand, which drove prices above supply and demand fundamentals.

For three years, farmers throughout the vanilla-growing world earned unheard of returns and responded accordingly. Farmers worldwide began feverishly planting and rehabilitating vanilla. However, nowhere has the response been as great as in PNG. By early 2004, the production from these increased plantings was entering a market that had contracted due to extremely high prices. By early July 2004, the inevitable price collapse had begun. It was about this time that vanilla fever was starting to grip SI.

8.3 THE PNG VANILLA PHENOMENON

As mentioned above, PNG experienced a meteoric growth in vanilla production between 2000 and 2004. It is useful to examine the reasons for the PNG vanilla phenomenon and their relevance for SI. The most obvious reason was the extremely high prices on offer. The grower price increased 1300% over a two-year period. Similar price increases were offered to vanilla farmers worldwide. Yet nowhere has the response matched that of the semisubsistence village farmers of the Sepik, in PNG. A combination of factors explains the PNG vanilla phenomenon. These are listed in Table 8.1, with comparisons made with the situation in SI.

Table 8.1 Vanilla production in PNG and the potential for Solomon Islands

PNG FACTORS EXPLAINING THE VANILLA PHENOMENON	THE CORRESPONDING SITUATION IN SI
Expectations of PNG vanilla farmers, unlike their counterparts in Madagascar or Tonga, were not tempered by the experience of previous low price episodes.	SI farmers similarly have no past experience with the vagaries of the vanilla market.
A depreciating exchange rate significantly inflated the prices received by PNG growers in nominal terms.	Even higher nominal values would be received by SI farmers.
Agroecological conditions in parts of East Sepik Province proved ideal for vanilla production. This is not true for many areas where vanilla has been planted in PNG.	Vanilla in SI is only suited to the northern Guadalcanal plains and possibly a few microclimate locations where there is a long, dry period to induce flowering.
The foundation of the industry was laid by a visionary nucleus producer who encouraged smallholders around him to plant. This provided the critical mass upon which a large-scale smallholder-based industry could quickly develop once the right price incentives existed.	This critical mass has been the missing ingredient in other Pacific Island vanilla industries. There will be no critical mass in SI.
The planting of vanilla proved very attractive to the semisubsistence farmers.	Expected to apply equally to SI in locations where good flowering is obtained.
To plant vanilla, sufficient land could be obtained through traditional land tenure arrangements.	Likely to also be true in SI.
The very high unit value of vanilla and its nonperishability made it particularly suited to farmers in remote locations.	Will also be true in SI.

8.4 LESSONS FROM THE PNG EXPERIENCE

If the development of a vanilla industry in SI is to be encouraged, there are important lessons to be learned from the PNG experience. At one level, the rapid development of the PNG vanilla industry has been a remarkable success story and indicates that it is possible to develop a major new export diversification industry in a Pacific Island country (PIC). Vanilla in PNG has provided a high income-earning opportunity to a large number of rural households in some of the most economically depressed and isolated areas of the country. This experience has shown how beneficial high-value niche commodities can be for semisubsistence village farmers in remote locations.

In a report to the AusAID-funded vanilla workshops in SI, Piero Bianchessi (2004) describes the situation that prevailed in PNG in 2003:

Farmers were planting more and more plants, and expecting higher prices without any knowledge of the market requirements for quality and aroma. The situation got worse when a number of incompetent buyers jumped into the market expecting big profit without any knowledge of the product they were buying, competing with the more competent buyers already established, and offering higher prices with absolutely no quality control.

The reality is that the PNG industry in its present form is not sustainable because of the following factors:

- substantially lower prices will prevail in the future
- too much vanilla has been planted
- there is a large volume of inferior-quality beans
- beans are harvested when immature
- beans are stolen
- there is reliance on small-scale curers
- there is a lack of information or there is misinformation on agroecological, agronomic and processing requirements
- there is a lack of exporter standards.

All these issues will have to be addressed if SI is to be successful in establishing a vanilla industry.

The PNG vanilla boom was reminiscent of the kava boom that gripped Fiji, Vanuatu and Tonga in 1998 and 1999. A major downside of most high-value niche export products, like vanilla, kava and now noni (*Morinda citrifolia*), is their price instability. This instability militates against benefits accruing to farmers and the national economy. Unrealistic expectations during price booms result

in a misallocation of household resources. During the price boom, there are large foreign exchange leakages and a high consumption of imported goods, including food. Little of the windfall income is saved for future investment and consumption needs. In PICs, the absence of rural financial services has contributed to these adverse effects.

Farmers become disillusioned when prices fall dramatically from high levels, even if they remain at a reasonable level in absolute terms. For many farmers there is a premature departure from the industry, leading to a further waste of resources. These farmers are subsequently not in position to take advantage of any future recovery in price. There is a need for policies and supporting programs to assist farmers to better manage their decisions in a highly unstable price environment. Such programs should focus on six main areas.

First, people need information on the nature of high-value niche-product markets. Second, people need information on the quality requirements of the market and how to achieve these requirements. High-value niche commodities are usually luxury products that have demanding quality requirements. For Pacific Island farmers, these products are not necessarily 'difficult' crops — but they are different from the crops they usually grow. In the case of vanilla, Bianchessi (2004) notes:

The main 'differences' that must be understood are:

1. Vanilla is an orchid, with different root exigencies.
2. In some latitudes, vanilla does not flower every year. The farmer must help the plant reach flower induction.
3. Curing vanilla is not a drying process, but a more complex fermentation.

Only the farmer willing to understand these differences will become a successful vanilla farmer.

Third, people need information on the agroecological conditions required to successfully grow the relevant crop on a sustainable basis. Fourth, there is a need to empower industry to establish and enforce quality standards. Fifth, there is a need to encourage the adoption of farming systems that minimise the risk. Finally, there is a need to establish rural financial services that encourage saving and investment to take advantage of periodic high prices.

8.5 FUTURE PRICE PROSPECTS

It is difficult to estimate how low world vanilla prices will fall and the duration of the trough that world vanilla prices are now entering. Because of the three-year resurgence in vanilla production and market, a low and long downside price can be expected. Empirical commodity studies have shown that extreme price spikes induce a much greater investment response in production capacity than does a period of moderately high prices (Mount and Chai 2004). As a result, extreme price peaks result in lower long-term average prices. Such seems to be the experience of the world vanilla economy. World vanilla production capacity is now probably well in excess of 3000 tonnes and increasing. Prices falling below US$20/kg can reasonably be expected, with at least three to four years before there is any sustained recovery.

The low prices will result in the inevitable 'shake out' among vanilla growers worldwide. Many growers, with alternative uses for their resources, will leave the industry if returns fall far short of their expectations. In a depressed market, the relative rewards for quality become greater, with grading standards more strictly enforced. With vanilla prices and quality improving, demand will steadily grow and prices will gradually increase, until a major contraction in supply (or expansion in demand) triggers a sharper increase in prices. Future price peaks are likely to be less extreme as Madagascar's market share declines.[24] Less extreme price peaks may mean higher average vanilla prices in the longer term, which is good news for vanilla farmers.

24 Evidence of this is provided by the market impact of Cyclone Gafilo, which struck Madagascar's vanilla growing areas in February 2004. From all accounts, the damage caused by Gafilo approached that of Cyclone Hudah. Yet it did little more than to delay the inevitable decline in world vanilla prices by a few months in the wave of increased production from other areas and declining demand.

8.5.1 PROJECTED RETURNS FROM GROWING VANILLA

By July 2004, prices for PNG vanilla had already fallen to K125–140/kg for grade 1 vanilla (McGregor, in press). In PNG, it has been suggested that a grower price in the vicinity of K70–80/kg (SI$170–195) for good-quality vanilla could provide a reasonable basis for planning over the next few years. Growers are starting to realise that poor-quality vanilla (low vanillin content, overdried, off-flavour and mouldy) is unmarketable.

The financial model presented in Appendix 3.7 shows the expected returns to an SI vanilla grower producing high-quality cured vanilla and receiving a farmgate price of $170/kg. It is probable that this farmer would be situated at a suitable location in northern Guadalcanal. In the model, the farmer plants 0.5 hectares (1000 vines) of vanilla. The average annual return from this area is approximately $11 500, received as a lump sum. More importantly, the return for effort is $120 per day. Few other crops could approach that rate of return. The gross margin for cocoa, a major crop in the area, is around $30 per person-day, depending on the prevailing price (see Appendix 3.3(2)).

8.6 RECOMMENDATIONS

Vanilla has a high unit value, can be produced on a small area of land without land title, requires only labour inputs and, once cured correctly, is nonperishable. Even at the significantly lower prices that are projected, vanilla provides a relatively high return to effort. Thus, in locations where it can be successfully grown, vanilla potentially has an important place in SI diversified agriculture. Farmers with the knowledge to cure quality vanilla, who implement this knowledge, and who are rewarded accordingly, have a sustainable future in the industry even at relatively depressed prices.

Currently, the most important requirement is to provide existing and potential farmers with information on where the crop can be successfully grown, how it should be grown and, most importantly, how it can be successfully cured. It is this lack of information that is now causing so many problems for the PNG vanilla industry as prices have receded to more normal levels.

Vanuatu's Venui Vanilla has published a simple, technically correct, pictorial manual on growing and curing vanilla in a Pacific Island environment (Bianchessi 2004). Experience in PNG, Fiji and Vanuatu has shown that farmers who follow this manual achieve outstanding results. The Community Peace and Restoration Fund should arrange to purchase a stock of these manuals for distribution to DAL and NGOs, such as the Kastom Gaden Association. They should then be sold, at a modest price, to interested farmers who have access to land in suitable locations. The information in the manuals should be complemented over the next few years by a series of workshops that use the expertise of Vanui Vanilla. There also needs to be support for restocking and propagating vanilla-planting material in North Guadalcanal.

In other words, SI should:

- provide existing and potential farmers with information on where vanilla can be successfully grown, how it should be grown and, most importantly, how it can be successfully cured (this can be done through a pictorial manual and through workshops)
- provide support for restocking and propagating vanilla-planting material in North Guadalcanal.

9 Chilli, pepper, ginger, turmeric and noni

9.1 INTRODUCTION

Several spice and medicinal plants commonly found in Solomon Islands (SI) could be commercially developed. This chapter analyses the potential of five such products.

9.2 CHILLI

9.2.1 BACKGROUND

Fiji and Cook Islands have developed a lucrative export market from fresh birdseye chillies to New Zealand under a non-fruit fly host export protocol. These chillies are in short supply and command premium prices. In November 2003, birdseye chillies from Cook Islands commanded a wholesale price of $25/kg compared with $6/kg for green chillies from Fiji (South Pacific Islands Trade and Investment Commission, Produce Price List 2003). An annual market in excess of 100 tonnes would seem a reasonable expectation for these chillies — albeit at a more modest price. Fiji and Cook Islands supply about half that amount. Unfortunately, SI is excluded from this remunerative export market because of the country's unfavourable fruit fly status and lack of direct airfreight links to New Zealand.

Quarantine is not an issue for dried chillies. While significant markets for dried chillies exist in Australia and New Zealand, SI would find it difficult to compete. During 2004, the price of Indian new crop dried chillies was US$850 (approximately SI$6300/tonne) fob Madras (Agra Informa 2004). It is highly unlikely that SI farmers could compete, given that Noro cannot attract sufficient supplies at a price of $50/kg. Certainly, the Nepalese akabare chilli, the variety grown in SI, commands a price premium. However, SI faces major constraints in securing export markets — volume, continuity of supply and quality. Marketshare Pty Ltd relates the problems faced by the Commodities Export Marketing Authority (CEMA) when trial shipments were made to the Australian market in 1997:

Lee McKeand conducted initial test marketing with their customers using the whole dried Nepalese akabare chilli samples provided by CEMA and were prepared to pay an initial order for 2 tonnes at a price of US$1250/tonne C&F Melbourne. Unfortunately we were advised by CEMA that this order could not be fulfilled due to delays that occurred in providing chilli seeds to the growers and subsequent late harvest.

Waters Trading had previously purchased a container of whole dried Nepalese akabare chilli from CEMA, however, they reported that they have not been able to sell this shipment to their customers because of the dark colour of the CEMA product, when compared with brighter bird's eye chilli from India. Given this situation they were not prepared to make further purchases from CEMA. (Marketshare Pty Ltd 1998)

Production of chillies reached 18 tonnes per year in 1995 and 1996, but it rapidly declined to less than one tonne by 2000 (CEMA records, 2000) with the onset of the ethnic tension, closure of the cannery at Noro (owned by the Japanese company, Taiyo), and the collapse of the CEMA buying network. There are no figures for total production after the ethnic tension. There are only limited opportunities to export dried raw Nepalese akabare chillies to Australia and New Zealand, because this variety is unknown there and the markets are dominated by Indian-produced birdseye chillies. In order to enter the market and compete, SI would have to either roast and grind the akabare chillies or switch production to the birdseye variety.

9.2.2 CHILLI TUNA

One way for SI to overcome quarantine constraints and add value well above world market prices is to add chilli to SI tuna and export the combined product in a can. This could provide a worthwhile opportunity to increase chilli production in Western Province, Malaita and North Guadalcanal, with the chillies sold to the Soltai cannery in Noro. Production of chilli tuna is currently constrained by the limited supply of dried chilli. Soltai only produces small batches of chilli tuna when it receives a shipment of chillies. The cans are then immediately sold in the domestic market, but ideally they should be stored for six months to allow the chillies to thoroughly permeate and flavour the tuna. Between January and August 2004, Soltai purchased just 80 kg of dried chilli, from a few growers, but it would like to purchase up to 500 kg/year to satisfy estimated domestic demand for chilli tuna. In a bid to increase supply, it has raised the buying price of chilli from $8/kg to $50/kg.

If Soltai could obtain enough chillies, there would be excellent opportunities to export chilli tuna to neighbouring Melanesian markets where the brand is well known. In the longer term, it could trade direct to niche markets in Australia and New Zealand, and via internet sales worldwide. Estimated demand for chillies would be at least 10 000 kg (dried); based on sales in the 1990s, this is achievable.

9.2.3 PROSPECTS

The major constraints to chilli production in SI are:

- shortages of seeds
- farmer reluctance to grow chillies because they are unpleasant to handle during harvesting and drying
- weak supply linkages
- inadequate knowledge on how to correctly dry chillies.

The following measures could support the revitalisation of the chilli industry in SI:

- multiplication of planting material for chilli production for the Soltai Fishing and Processing Ltd factory at Noro
- training of villagers in postharvest handling and drying of chillies
- preparation of a pictorial manual on growing, postharvest handling and drying chillies in SI
- support and assistance for Soltai, the Department of Agriculture and Livestock (DAL), CEMA and growers to re-establish chilli supply chains by promoting chilli production and the development of provincial grower groups.

9.3 PEPPER

Pepper requires a hot and wet climate and an altitude below 300 metres. This makes the crop suitable for a much wider geographical range than vanilla and less demanding in terms of labour and skill requirements. Dried black peppercorn is much less perishable than green vanilla beans and thus faces fewer marketing constraints. Around 25 days of labour is required to establish and maintain 300 vines producing black pepper on 0.33 hectares. Flexibility in spacing allows for intercropping between vines and underplanting coconuts.

Pepper is usually considered as a bulk commodity, dominated by large producers in Vietnam, India, Malaysia and Indonesia. Vietnam, now the world's largest exporter, produces more than 100 000 tonnes of pepper annually from 50 000 hectares (Agra Informa 2004). It is unlikely that a tiny, fledgling SI pepper industry

could compete. However, other Pacific Island countries (PICs) — Pohnpei (Federated States of Micronesia), Vanuatu and, to a lesser extent, Fiji — have shown that it is possible to establish small pepper industries based on gourmet-quality production. These industries target local and niche export markets. The Honiara-based Bulk Store is a potential buyer of black pepper if good-quality supplies are available. Creating the necessary marketing links with private sector buyers is the biggest challenge to the successful development of this small industry.

Economic analysis of smallholder pepper production at South Santo in Vanuatu shows an annual return of 31 500 vatu (approximately $2100) and 1200 vatu ($80) per person-day of effort (Vanuatu Land Use Planning Project 1995)[25] from 300 pepper vines. This farmer sells the dried and clean peppercorns to a local company at a delivered price of 350 vatu ($23) per kilogram. The pepper is then onsold in attractive value-added packaging. To generate this income, the farmer would need to invest in materials to build a small drier (iron for a ridge cap, some clear plastic, and wire for drying racks). The Vanuatu model assumes that the drier would be used for other products, such as dried chillies.

For an SI farmer, pepper and dried chillies would be compatible enterprises using the same investment in processing infrastructure. In Vanuatu, a vanilla curer would probably also dry pepper. For these farmers, pepper represents an activity with a low labour input, low risk and reasonable return. Harvesting and processing are done at the same time, for a lump sum payment, which many growers find attractive.

Like vanilla and chilli farmers, potential pepper farmers require training in postharvest handling and drying. They would benefit from the preparation of a pictorial manual on growing, postharvest handling and drying of pepper — similar to the one that has been produced for vanilla and is proposed for chillies.

9.4 GINGER AND TURMERIC

9.4.1 BACKGROUND

Ginger and turmeric thrive in high-temperature and high-rainfall environments, but demand free-draining soils. Without irrigation, an average annual rainfall of around 3000 mm is required. Substantial areas of SI would meet these requirements. Both ginger and turmeric are already grown in village gardens, with some being sold at urban markets. Some high-quality ginger can be seen in the Honiara market. The planting material for this ginger was said to have been originally sourced from Fiji and thus would be of the Cantonese variety, which is sought after by export markets. However, most ginger currently growing in SI is a small-rhizome local variety that would not be suitable for export. Export quality could be achieved if the right variety were planted and if people followed the correct package of practices. If SI is free from major ginger diseases and can remain so, it will have an important advantage in the production and export of fresh ginger. However, the pest and disease status needs to be determined before serious industry development can be contemplated.

9.4.2 POTENTIAL MARKETS

If SI has a satisfactory pest and disease status, it might be possible to develop a ginger industry targeting niche markets in New Zealand, Japan and even Australia.

New Zealand

New Zealand has experienced strong growth in fresh ginger consumption, with imports growing at around 8% per year over the past decade, to stand at around 500 tonnes (New Zealand Trade Statistics[26]). Over this period, Fiji's share of the New Zealand market has fallen from more than 95% to around 25%. Yet Fiji ginger remains popular among the Asian community because of its greater pungency and favourable price relative to Australian ginger. The wholesale price for Fiji ginger in New Zealand is usually around NZ$4/kg.

25 See http://www.biodiversity.com.vu/lupo.htm

26 See www.stats.govt.nz

Fiji's traditional ginger-growing areas now face serious disease problems. This might provide an opportunity for SI ginger to capture a small market share. A bilateral quarantine agreement with New Zealand would have to be negotiated, with the first step being the compilation of a comprehensive pest list for ginger in SI.

Japan

Japan, which has an ageing farmer population, increasingly imports its ginger requirements. In 2000, it imported 47 826 tonnes of fresh ginger, compared with only 4370 tonnes a decade earlier.[27] Most of this ginger comes from China. The landed price of Chinese ginger is low — an average of ¥57/kg (approximately SI$3.85/kg) in 2000. However, Thailand exports significant quantities of fresh ginger to Japan at about three times the Chinese price.

People wishing to export fresh ginger to Japan require certification that the soil in which the ginger is grown is free from the nematode *Radopholus simulis*. This requirement creates both a constraint and an opportunity. The *Radopholus*-free requirement precludes many potential competitors from the Japanese fresh ginger market. However, DAL needs to have the technical and organisational capability to meet this certification.

Suitable ginger-growing locations in SI may have a distinct advantage in meeting the *Radopholus*-free requirement. Since these areas have not grown ginger commercially, they can be expected to be *Radopholus* free. It is essential that clean seed, preferably obtained from tissue culture, is used to ensure that this status is maintained without having to resort to soil fumigation.

Australia

In Australia, fresh ginger consumption is estimated to be 2000 tonnes. While the country has its own substantial ginger industry in southern Queensland, the populous southern states potentially offer the best market opportunity for fresh ginger from SI. Fresh ginger wholesale prices in Australia range from A$2/kg to A$8/kg, depending on the season. Prices tend to peak in January and February, which is the beginning of the new season. There would clearly be a market for good-quality fresh ginger from SI if it were available at a reasonable price.

Australia has had a longstanding interest in importing ginger from Fiji. However, this has not been possible for quarantine reasons. The quarantine restriction would seem to be unreasonable, given that the ginger would be sold in southern Australia, thousands of miles from the Australian ginger-growing area; Fiji is permitted to export ginger to Hawaii, which is a major ginger producer; and Australia itself has a very unfavourable disease status with respect to ginger.[28]

9.5 NONI (MORINDA CITRIFOLIA)

9.5.1 BACKGROUND

Noni is used throughout the Pacific Islands, where it grows wild. It is used as a traditional herbal medicine for a whole range of ailments. In recent years, noni products, particularly noni juice, have become popular in Western countries. A market boom has led to a proliferation of noni enterprises in many PICs, including, recently, SI.

At least three commercial noni enterprises have been established in SI. The most substantial of these is Solomon Morinda Pty Ltd. This company has invested several million dollars in plant that processes green noni fruit[29] and is targeting the Korean and Japanese markets.

27 Japan Fruits and Vegetables Import Promotion Association, Statistics for Imported Fruits and Vegetables 2000

28 According to Dr Graham Stirling, Plant Protection Unit, Queensland Department of Primary Industries, the following economically significant ginger pest and disease groups are officially listed as present in Australia: bacteria and mycoplasmas (bacterial wilt, big bud, soft rot; fungi (fusarium yellows, rhizome rot, Pythium seedpiece rot, rhizome and basal stem rot); and nematodes (root-knot nematode).

29 Normally, noni fruit is processed fully ripe via a fermentation process. Solomon Morinda has developed a green processing technique that is line with Asian herbal medicine tradition. The medicinal qualities are reputed to be enhanced through processing the fruit green (see http://www.worldno1noni.com). This has required much more substantial investment in extraction equipment.

Table 9.1 Prices for noni products

PRODUCT (AS DESCRIBED ON THE WEBSITE)	QUANTITY	RETAIL PRICE (US$)
100% authentic TAHITIAN NONI® juice		
	1 bottle (33.8 oz) (A one month's supply at recommended amount of two tablespoons per day)	$40
	1 case (4 x 33.8 oz bottles)	$160
100% authentic Kosher TAHITIAN NONI® juice	1 case (4 x 33.8 oz bottles)	$168
Handi-Pack 250 mL pack (one week supply — easy for travel and work)		$16
TAHITIAN NONI ® SMART EXTRACTS		
Joint Support Smart Extract	1 bottle (33.8 oz)	$32
Cardio Support Smart Extract	1 bottle	$39
Energy Smart Extract	1 bottle	$32
Memory Smart Extract	1 bottle	$32
Original Tahitian Noni Extract	1 bottle	$26
Stress Support Extract	1 bottle	$32
TAHITIAN NONI ® SKIN CARE		
Facial Care System (dry)	2 months' supply	
Milky Cleanser; Hydrating Toner; Revitalizing Serum; Protective Moisturizer		$120 (each)
TAHITIAN NONI ® HAIR CARE		
Shampoo (8 oz); Conditioner (8 oz)		$12 (each)
Hair Recovery Complex (4 oz); Hair Reconstructor (4-pouch carton)		
Hair care system		$25 (each)
TAHITIAN TRIM ™ WEIGHT MANAGEMENT SYSTEM		
TAHITIAN NONI hoa 1 and 2 Complete Nutritional Smart Caps™ Delivery system (1 month supply)		$33
Tahitian Noni Fiber 15.8 oz — 30 servings		$29

Source: Prices for a typical Morinda Inc Independent Distributor (as per the company's website): http://www.tahitia1.securesites.com

9.5.2 CURRENT MARKET SITUATION

Unlike in Polynesia and Fiji, noni is not well known to most Solomon Islanders. Thus there is no core domestic market for a product in a convenient form. Any significant noni industry development will depend on export markets.

The opportunities for noni-based products stem from the worldwide growth in demand for new herbal products in affluent countries. This demand growth is led by the United States (US). A major breakthrough in overcoming regulatory barriers to the herbal market came with the passing of the *Dietary Supplement Health and Education Act* in 1994. The Act allowed for the marketing of herbal products as dietary supplements based on traditional use and for their regulation as food additives, rather than as drugs. This all but exempts herbs and other supplements from federal oversight, provided no pharmacological claims are made. In this market environment, Morinda Inc has been able to amass noni sales of US$30 million over the past five years.[30]

30 See http://www.tahitian-miracle.com

Retail prices in the US are high, although they are beginning to fall as the market becomes saturated (see Table 9.1). With one month's supply of noni juice costing US$40, most consumers will expect tangible results in a short time.

The herbal market in Europe is much more conservative and regulated. Greenwald (1998) reports that in Germany, where the government has supervised studies of some herbs approved for sale in the country's strictly regulated pharmacies, the most popular remedies are generally those that have been the most thoroughly investigated. In the European Union (EU), noni juice is considered as a food and is therefore subject to the Novel Food Regulation of 1997. Under this regulation, any food first imported into the EU after 1997 has to show that it is not deleterious to human health. This was largely a response to genetically engineered products. Unfortunately, compliance is expensive and time consuming. Morinda Inc's application remains pending after several years. Exports of noni juice to the EU are now seriously constrained until approval is granted to Morinda Inc.

Countries close to SI have developed sizeable markets for noni products over the past few years. In a recent survey, the Secretariat of the Pacific Community (SPC) estimated the annual wholesale value of these two markets combined to be A$3.3–4.5 million and the retail market to be A$6.9–9.5 million (Wilson 2001). Morinda Inc has a market share of about 90% of the Australia and New Zealand market. Thus, Fiji shares a market of less than $1 million with suppliers from other PICs. The SPC survey estimates retail prices in Australia and New Zealand of around A$88/litre.

The internet (or e-commerce) is eminently well suited to high-value, nonperishable herbal products. Not surprisingly, hundreds of websites have sprung up selling noni products. Many of these are independent Morinda Inc distributors. Fiji's two largest exporters, Herbex Limited and Royale Noni, have commercial websites. The use of the internet as the medium of trade has substantially reduced marketing and product promotion costs by allowing buyers to find sellers rather than vice versa.

Solomon Morinda has targeted Korean and Japanese markets, with a unique product processed from green noni fruit. The company is reporting an fob price of A$7/litre for a bottled product shipped out of Australia. There is now severe competition from noni juice being produced in Vietnam and Cambodia.

9.5.3 FUTURE MARKET PROSPECTS

Acceptance of noni juice under the EU's Novel Food Regulation would substantially boost the market demand. Expansion of the US market and other markets is seriously constrained by a lack of proof of noni's pharmacological efficacy. There would seem to be no good reason why noni juice should not pass the requirements of the regulation if EU regulators could be engaged on the matter. While it may be difficult to scientifically substantiate the beneficial health claims of noni, it is unlikely that it would be shown to be a food that is deleterious to health. However, beyond the constraint of the Novel Food Regulation in Europe, there are indications that noni is a fad that might have already run its course unless scientific evidence to support its health claims can be produced.

The market for most new herbal products tends to lose interest quickly. Products tend to be fads, particularly in the North American 'baby boom' market. There is a lot of hype about them, particularly in internet advertising, which raises unrealistic expectations regarding the products' attributes. The initial burst of demand leads to a price boom that can be fuelled by speculators. A high percentage of consumers never buy the product again when it fails to meet their unrealistic expectations, particularly when prices are high (such as US$50 for a month's supply of noni juice). For genuine products, loyal consumers will remain, particularly if prices fall to more realistic levels. Noni is such a genuine product within the bounds of traditional claims. These consumers will provide a core market and a basis for steady growth. The 1998 kava boom and subsequent price collapse is a classic example of this cycle for herbal product fads.[31] However, there are many other examples — aloe vera, St John's wort and ginkgo,

31 In 1997, the world price for kavalactone (the active ingredient in kava) was around US$150–200/kg; by March–April 1998, it had risen to US$500/kg. However, by the end of 1998, it had fallen back to US$250 and it has now fallen back to around pre-boom levels.

to name a few. Indications are that prices of noni products have peaked and they are now in the downward phase of the price cycle. A search of the noni websites reveals much price cutting by small, independent operators.[32]

The SPC survey of the Australia and New Zealand market concludes that there has been limited growth in the market for noni products due to a lack of active promotion of the product and a lack of clinical information regarding the proven benefits. The survey concludes that 'noni has its current supporters and loyal customers but the market is not growing'.

Noni is now also facing competition outside the Pacific Islands region — particularly from Vietnam and Cambodia. The plant is native to the islands of Malaysia, the Indian Ocean and the Pacific Ocean. However, it is now found throughout much of the tropical world. It grows well in a range of lowland habitats — performing best in relatively dry to moderately wet conditions, from sea level to elevations of 500 metres. A transplanted seedling can come into fruit within a year, although it will take two years to reach full production, after which it may last many years. Thus it is somewhat surprising that competition from Asian producers is only now having an effect on the market.

An export market showing little or no growth does not mean that a small, efficient noni-processing operation in SI could not be profitable well into the future. Enterprise models show that there is considerable scope for reducing fruit and juice prices while remaining profitable. There are opportunities for new entrants provided they are efficient, keep their overhead structures low and incorporate compatible diversification activities. Establishing a commercial website would be essential for export-orientated business to succeed. A processing enterprise might be well advised to diversify into other activities that use its processing and marketing infrastructure (its website). For example, Solomon Morinda's processing facilities could be used for producing ngali oil.

9.6 RECOMMENDATIONS

9.6.1 CHILLIES

- Chilli production for chilli tuna should be promoted.
- Provincial chilli grower groups should be established and developed.
- Villagers should be trained in postharvest handling and drying of chillies; in particular, a pictorial manual specific to SI should be developed.

9.6.2 GINGER AND TURMERIC

- A comprehensive pest list for ginger in SI should be developed as a first step in accessing the New Zealand market.
- DAL should acquire the technical and organisational ability to certify ginger free from the nematode pest *Radophilus simulis*, to help in accessing the Japanese market.
- Australia should be asked to re-examine its quarantine ban on ginger from Pacific Island countries.

32 The authorised Morinda Inc distributor website is now offering 33.8 fl oz bottles of 'authentic Tahitian Noni' for US$56. Royale Noni's website is currently offering one-litre bottles of Fijian noni juice for US$20.

10 Coffee

10.1 INTRODUCTION

Solomon Islands (SI) only produces a few tonnes of coffee annually. In contrast, coffee is Papua New Guinea's (PNG) major industry, providing livelihoods for 43% of rural populations and generating export earnings in excess of the equivalent of SI$600 million. The existence of a large PNG coffee industry suggests that coffee could potentially be a significant contributor to rural livelihoods in SI.

The PNG highlands provide ideal conditions for the production of high-quality arabica coffee. SI cannot match PNG's vast expanse of suitable highland areas, however, SI has areas that could produce quality arabica coffee. These include higher-elevation locations, such as Central Malaita. Most lowland locations that now grow cocoa could successfully grow lower-priced robusta coffee, although this would provide significantly lower returns than cocoa.

Twenty years ago, it would have been worthwhile to promote coffee as a major diversification crop to improve rural livelihoods. This is no longer the case: in the intervening years, there has been an irreversible structural shift in the world coffee economy. A decade ago, world market prices for coffee were around 2.5 times what they are today. There has been an explosion in output of low-quality robusta coffee from Vietnam and medium-quality arabica from Brazil. The rapid expansion in world coffee production can be attributed to the widespread adoption of new high-yielding, early-maturing varieties that have a high degree of disease resistance. There has also been mechanisation of all aspects of production, from planting and pruning through to weeding and harvesting. This has lowered the cost of production considerably. The quality of coffee is not as good, but the market is prepared to buy at considerably lower prices. The abundant availability of extremely low-priced coffees has forced roasters to rethink and restructure their blend requirements. Mike Wheeler, marketing consultant to the PNG Coffee Industry Corporation, believes this has probably brought about a permanent shift in the pattern of demand (Wheeler 2002). In this environment, a small, new entrant to the mainstream world market has little chance of succeeding.

The low producer prices for coffee have not meant that the value of the world coffee economy has remained stagnant. On the contrary, the value of the industry has boomed at the retail level, particularly in more affluent markets. In the early 1990s, the retail value of the world coffee industry was about US$30 billion; it now exceeds US$70 billion (Osorio 2003). However, growers' share of the profits has fallen from 40% to 10%.

This changed structure of the world coffee economy has created opportunities for niche marketing, which a small SI industry may be able take advantage of. There are two main opportunities:

- import substitution, such as selling a branded coffee on the domestic market (the Fiji and Samoa model)
- exporting a speciality differentiated SI coffee (the East Timor and Tanna Coffee model).

10.2 IMPORT SUBSTITUTION

Both Fiji and Samoa have been successful in developing their own coffee product labels for local consumption. 'Fiji coffee' is now the coffee of choice in the tourism sector. This market consumes approximately 150 tonnes and has been growing steadily. Approximately 50 tonnes of roasted Fiji coffee is exported annually. When Fiji coffee was launched more than a decade ago, around 5% was grown locally (high-grade arabica coffee grown on the Island of Taveuni). The balance comprised arabica green beans imported from PNG, roasted and packaged in Fiji and labelled as Fiji coffee. Currently, virtually 100% of Fiji coffee is produced from green beans imported from PNG. 'Samoan coffee' successfully competes with imported instant coffee among consumers in general. Samoan coffee is a blend of locally grown robusta (< 5%) and imported PNG arabica coffee (imported as green beans and roasted in Samoa).

The value added from both these enterprises is substantial, because there is a large margin between world green bean prices and the retail price for roasted coffee. Both the Fiji and Samoan enterprises could absorb significantly increased quantities of local beans if these were available at competitive prices (landed price of PNG beans, including duty). However, this price is not sufficiently attractive for local growers in either country. If the experience of SI growers with copra is anything to go by, Solomon Islanders may find these coffee prices quite attractive.

An Isabel-based entrepreneur has attempted to develop a small coffee industry to supply the local market. The business has faced quality and marketing constraints. Honiara's Bulk Store carries this local coffee, but finds the product difficult to market, because of 'off' flavours and poor packaging. This coffee enterprise, and other interested businesses, could benefit from technical assistance in coffee processing and packaging. There is a sizable local market available: currently around 150 tonnes of coffee is imported annually. The weakness of the SI dollar and high transportation costs provide a high-level natural protection for such an import substitution industry to develop.

10.3 EXPORTING 'SINGLE ORIGIN' SOLOMON ISLANDS COFFEE

Of all tree crops, coffee offers the greatest opportunity for speciality niche markets based on growing location. Premium prices paid for 'Jamaican Blue Mountain' coffee are the most prominent example of this. In more affluent markets, there has been a phenomenal proliferation of Starbucks-type coffee shop enterprises in recent years. The menu board of a coffee shop will invariably include 'single-origin' coffee. Typical offerings might include Jamaican Blue Mountain, Costa Rica Bella Vista, Colombia Narinio, Ethiopia Yergacheffe, and Kona (Hawaii) coffee. There are also now numerous websites that sell single-origin coffees. The following preamble is typical of such websites:

Travel to distant lands each day and discover the unique taste and aroma of single origin coffees. These distinctive coffees offer the story of the people, their culture and their eco systems that produce every cup. Unlike blended coffees, which have a specific flavour profile year-round, single origin coffees offer the coffee drinker the opportunity to take the unique aromas and flavors of particular regions of a given country and experience how these aromas and flavors change with the season. Discover the best-kept secret in specialty coffee: explore the world of single origin coffee and a new world of flavor.[33]

33 See http://www.taylormaidfarms.com/single_origins.html

For PNG, such speciality markets currently represent only a small percentage (less than 0.5%) of total production. This is expected to grow, particularly if the markets are associated with good-quality production. However, the small East Timor and Vanuatu (Tanna Coffee) industries are built around single-origin markets. An exotic coffee from Isabel or Malaita could be sold in this way if growers could meet requirements for quality and continuity of supply. Organic and fair-trade certification would now probably also be necessary for successful entry into these markets.

Producing organically certified coffee presents no particular technical difficulties. The fact that coffee is generally easy to grow organically means that there is likely to be increasing competition from other countries. Coffee has been a particular focus of the fair-trade movement, as a result of the rapidly shrinking share of world coffee market profits received by farmers. Fair-trade marks are attractive to consumers at the top end of the market who feel they are doing something tangible to help impoverished, smallholder farmers in distant places.

Small quantities of fair trade-certified coffee are now being exported from PNG at an fob price three times the price prevailing at the time for Y grade coffee (Wheeler 2002).[34] This was sourced from two grower groups registered with the Fairtrade Labelling Organizations International, one of which was also organically certified. The product is sold on the internet and is described as follows:

The villages of Aseki and Menyama have been practicing sustainable farming methods for over 25 years. Organic coffee is the only revenue source for the people of this region and is grown by individual families on small plots. New Guinea coffees are often compared to a fine Pinot Noir: bright, sweet, shimmering with seductive floral and wine-like fruit notes.[35]

Fair-trade certification is ideally suited to impoverished farmers in isolated locations, where the price premiums received can offset the cost disadvantages of location. However, as with organic markets, linking these farmers to alternative trade markets poses a major challenge. The administrative costs of establishment and compliance are considerable, and the investment requirements in this area should not be underestimated.

34 Y grade is the classification for around 60% of PNG smallholder coffee.

35 See http://www.taylormaidfarms.com/single_origins.html

11 Livestock products

11.1 INTRODUCTION

Livestock are an important component of subsistence production in Solomon Islands (SI) and are kept by 75% of rural households. Pigs and chickens are the dominant species, with other species contributing relatively little to production at the village level. This section draws heavily on the Livestock development report (Volume 2, Chapter 2).

11.2 CURRENT INDUSTRY SITUATION

11.2.1 PIGS

Pigs have high cultural importance in SI and are used primarily for feasts, to pay bride prices and to meet other traditional cultural obligations. There is significant potential to improve the productivity of subsistence pig husbandry through better feeding and husbandry practices.

Small-scale commercial production of pigs is common on Guadalcanal and Malaita, for selling into the Honiara market. Approximately 50 pigs per week are shipped from Malaita, returning approximately $2 million each year to Malaita. The Honiara market could easily absorb twice this number at present. In the past, there were pork exports to Nauru, when it had a high level of disposable income. There is potential for commercial exports of pork products to Bougainville in Papua New Guinea (PNG).

Production of native pigs for the feast market is primarily conducted in distant Temotu Province, and shipments of approximately 200 pigs arrive in Honiara on the decks of merchant vessels. Throughout the provinces, pigs that are surplus to requirements are easily sold for the feast market or into the local butcheries. Butcheries prefer to purchase crossbred pigs: these have generally been fed some level of concentrates so they have more meat and less fat. It is difficult to estimate the annual value of SI pig production for both village and commercial use, but it would be in the order of $20 million. Value added could be increased through better use of locally available feed.

11.2.2 CHICKENS

Chickens are kept in villages in low-input, low-output systems where they scavenge for feed and are occasionally fed to prevent them from becoming feral. Feed consists of cut coconuts, papaws, other fruits and food scraps. Housing is rarely provided. Eggs are rarely found or collected, except by local dogs. Eggs that are located are generally placed under a brooding hen rather than being eaten, so as to ensure future populations. Hens hatch eggs in bush areas surrounding the villages, and chick mortality is generally very high due to exposure, disease and predation by dogs and hawks. Birds are sold live, among villagers or through the local markets, or are killed for local consumption. The population of village poultry is estimated to be approximately 220 000 chickens, with an annual

production value of approximately $5 000 000. Simple husbandry and the expanded use of dual-purpose birds (meat and eggs) would greatly increase the value of annual production.

11.2.3 CATTLE

Only about 1% of rural households graze cattle, which is the lowest level of any Pacific Island country (see Table 11.1). Cattle and goats are kept by a small number of households (probably fewer than 150 households) and currently contribute little to the national economy. Cattle, in particular, have the potential for greater use in smallholder coconut plantations due to their dual role as sweepers (reducing undergrowth through grazing) and meat producers. The productivity gain potential for the beef industry is considerable via relatively low-cost improvements in nutrition through using local resources (pasture and local feed supplements).

Lessons can be learned from the mistakes of previous development work to initiate productive and sustainable systems for local cattle consumption and import substitution. However, the village-based, smallholder cattle industry will work most effectively in collaboration with an active medium- to large-scale commercial sector. These linkages are borne out by the strong performance of the Vanuatu beef cattle sector. The smallholder subsector requires a specific study to identify appropriate parcels of alienated lands and supportive surrounding communities, and requires investors who are willing to collaborate with the smallholder sector to improve the overall production of beef cattle in SI.

11.2.4 HONEYBEES

Honeybees are kept by about 300 households in SI. Before the ethnic tension, a small export market was developing, with 30 tonnes exported in 1999. Honey is consumed locally, and sales are coordinated through a cooperative that also supplies basic necessities for production. Unfortunately, the Asian bee entered Guadalcanal during the ethnic tension and has devastated production on that island. It is probable that the Asian bee will spread throughout the major islands over time, although more remote islands may be spared. Strategies are currently being developed to minimise the impact of the Asian bee, and early results are positive. Honeybees have potential for remote islands where alternatives for income-generation are very limited.

11.3 POTENTIAL TO IMPROVE LIVESTOCK PRODUCTION

SI is a substantial importer of beef and poultry products. Imports for 2001–03 are shown in Table 11.2. They amounted to an annual average of 199 tonnes of beef (valued at $2.4 million), 63 tonnes of sheep meat ($647 000), 66 tonnes of poultry meat ($793 000) and 135 000 dozen eggs ($1.8 million). The average value of these livestock product imports was $5.6 million.

Table 11.1 Cattle grazing in selected Pacific Island countries

	NO. OF HOUSEHOLDS GRAZING CATTLE	PROPORTION OF HOUSEHOLDS GRAZING CATTLE (%)
Fiji	42 900	45
New Caledonia	2 100	19
PNG	8 700	2
Samoa	2 400	15
Solomon Islands	300	1
Tonga	1 700	12
Vanuatu	10 700	49
Total	68 800	9

Source: Macfarlane 1996. Figures included semicommercial smallholders as well as commercial smallholders and largeholders.

11.3.1 PIGS

SI is virtually self-sufficient in pig meat. However, there is huge scope to expand domestic consumption by increasing availability and reducing prices. Weaning and subsequent growth rates of native pigs can be increased by 80% and 50%, respectively, through the adoption of improved feeding and management systems. Growth rates can be further improved, by up to 100%, by introducing European breeds to produce crossbred pigs to replace native pigs. The cumulative benefits of widespread adoption of improvements would be substantial.

Table 11.2 Livestock product imports, 2001–03

	2001		2002		2003	
	Quantity (kg)	Value ($)	Quantity (kg)	Value ($)	Quantity (kg)	Value ($)
Beef	166 054	1 694 364	217 933	2 396 453	213 979	3 192 926
Pork	707	17 360	1 872	44 833	107	951
Sheep meat	113 120	1 068 731	52 964	637 866	22 295	235 555
Poultry meat	103 447	1 123 031	39 897	333 093	53 589	922 917
Eggs (dozen)	162 520	1 542 652	190 262	2 307 397	51 325	1 425 597
Total		**5 446 138**		**5 719 642**		**5 777 946**

Source: Ministry of Trade and Commerce

11.3.2 CHICKENS

Village chicken production could be dramatically increased by the introduction of pens to protect chickens from weather and predation, simple husbandry to reduce chick mortality, improved feeding systems, and the introduction of dual-purpose birds. Improved viability of commercial poultry production depends on the local production of high-quality feeds at a lower cost than imported feeds.

There appears to be a particularly high demand for eggs, reflected in the high levels of egg imports — an average of 135 000 dozen eggs per year in 2001–03. Now that the SI economy has returned to normal, it is likely that these imports now exceed 150 000 dozen eggs. A shortage of eggs can be seen in Honiara and in the provincial centres.

11.3.3 CATTLE

There is enormous scope for increased cattle production, commencing with the distribution of tethered cattle to use some of the country's vast grassland resource. Furthermore, the current large-scale importation of beef offers a considerable profit margin for local production. The scope for improved productivity is vast, but the challenges are significant, due to the steady decline in the sector over the past 25 years.

11.3.4 HONEYBEES

The honey industry has considerable potential to expand, focusing on geographically isolated islands where the Asian bee has least chance of invading. Returns on investment per hive are reported to be excellent.

11.4 RECOMMENDATIONS

Improving livestock production in SI could be achieved by:

- improving subsistence and small-scale commercial pig production in all provinces
- developing small- and medium-scale commercial pig production in Guadalcanal and Malaita
- improving the productivity of subsistence poultry systems throughout SI
- improving participation of smallholder poultry farmers in supplying commercial markets in the provincial capitals
- re-establishing medium-scale poultry production units on Guadalcanal
- re-establishing smallholder cattle production in provinces for supply of beef to commercial markets in the provincial capitals and Honiara
- supporting the continued development of honey production for supply of local and export markets and to increase the number of people involved in the industry.

12 Cross-commodity issues

12.1 INTRODUCTION

Efficient marketing requires adequate roads, adequate shipping services and timely communications. It also requires the participation of good farm supply businesses and adequate financial investment in the agriculture sector. This chapter discusses these and related issues.

12.2 ROADS

Adequate roads are a basic necessary condition for efficient marketing. In Solomon Islands (SI), this condition is seldom met. Guadalcanal and Malaita are the only two provinces with substantial networks of roads, many of which are now often unusable. Guadalcanal has 320 km of roads; the main trunk road runs across the north coast for approximately 150 km. Malaita has around 300 km of roads that service the northwest and northeast parts of the island.

Before the building of new roads can be contemplated, a major upgrading program of the existing road network is required. This is a precondition for significant gains to be made in the production and marketing of agricultural produce. Provincial reports identify the following road rehabilitation problems and priorities (see Volume 4).

12.2.1 CENTRAL PROVINCE

The road infrastructure is in a poor state of repair, including 31 km of roads on Small Gela and Big Gela islands. The coastal road on Savo Island has been destroyed in parts. The highest priority for road maintenance is the networks in southwest Small Gela and northeast Big Gela. Road repairs would improve access to the regular shipping services of Gela Passage, particularly during the southeast trade wind season for Small Gela.

12.2.2 CHOISEUL PROVINCE

The logging road from Chirovanga to Choiseul Bay requires upgrading. This is a high priority, given the relatively large area of land with agricultural potential in the northwest of the island. There are approximately 25 km of road from Kolombangara to Sepa on Choiseul Island. A road network linking these areas with Choiseul Bay would help to develop transport for small-scale sawn timber and cocoa, ngali nut and other crops between these major centres.

12.2.3 GUADALCANAL PROVINCE

There are approximately 320 km of road in North Guadalcanal. Despite the efforts of the Community Peace and Restoration Fund (CPRF) road rehabilitation program, many are still in a poor state of repair. Given the agricultural potential of North Guadalcanal and the large market for fresh food and animal foods in Honiara, further road rehabilitation

and maintenance in North Guadalcanal is a priority. The north coast road has been repaired to some degree, although it still requires maintenance. In particular, the section between Ruavatu and Aola requires attention and is currently unusable. In south Guadalcanal, the road constructed between Marau and Avuavu on the Weather Coast has deteriorated and cannot be used by vehicles except for very short stretches. Given the topography and rainfall extremes of the area, agricultural potential is limited and road reconstruction could not be justified on economic grounds. Any improvement in transport infrastructure on the Weather Coast would relieve pressure for out-migration and bring some economic benefits to this undeveloped region.

12.2.4 ISABEL PROVINCE

The road system is not well developed in Isabel, but roads are important for any land-based development. There are 113 km of road, including the 87-km gravel road between Hograno, Kia and Havulai, which has deteriorated due to lack of maintenance. The Kaevanga to Kolomola road (17 km) is also in a poor state and needs urgent maintenance. The Buala to Holokama road (3 km) requires extension so that potential agricultural areas at Gozoruru and Garanga are accessible. Improving and extending these roads will increase agricultural production in these areas.

12.2.5 MAKIRA/ULAWA PROVINCE

There are about 120 km of road in the province, 67 km on Makira, 40 km on Ulawa and 7 km on Ugi Island. An expanded road network that provides access to the productive lands of the Warahito Basin and other areas to the east of Kirakira would increase agricultural productivity. This would require a bridge to cross the Rama River and about 20 km of road to be constructed southeast from Kirakira. In addition, bridges are required to provide all-weather access from Kirakira to Marou Bay — another potentially important agricultural area.

12.2.6 MALAITA PROVINCE

There are about 300 km of road on Malaita Island. Most roads are in a poor to very poor state of repair, as are some bridges. All roads in west and north Malaita require maintenance, beyond the basic work done through the CPRF community-based road program. In North Malaita where roads have been repaired there has been an immediate response in terms of economic activity, particularly with respect to copra- and cocoa-buying. A loan from the Asian Development Bank will fund the repair of several bridges, but the needs are much greater than this. Given that one-third of the rural population of SI lives on this island, maintenance of roads would have a significant impact for marketing copra, cocoa, fresh food, pigs and other export crops. High population pressure on land in North Malaita is impacting adversely on food production. It could be relieved by constructing roads to the centre of the island and the east coast, so that food and cash crop production could expand and relieve pressure on currently used land.

The CPRF road program on Malaita has been successful in developing a system for community-based road rehabilitation, and the people involved have been efficient in making the best use of available resources. However, the overall impact of this program has been severely constrained by the lack of basic machinery. Presently, the CPRF Malaita road rehabilitation program has only one grader at its disposal. It is suggested that a basic pool of second-hand machinery[36] be supplied to this program to significantly enhance its capability.

12.2.7 RENNELL AND BELLONA PROVINCE

There are approximately 86 km of road on Rennell and 32 km on Bellona. Roads are in reasonable condition because of the coral base. On Rennell Island, roads are of crucial importance to agriculture and for access to services because most people live in the interior of the island and canoe access is difficult. A small increase in the length of feeder roads on Rennell would result in a significant extension of accessible land for agriculture and would reduce pressure on land closer to the existing road.

36 The pool of equipment proposed is one grader, one loader, one roller, four tipper trucks and possibly one dozer. The estimated cost if good quality used equipment is purchased is around A$800 000 (Ken Monroe, Ministry of Infrastructure, pers comm, November 2004).

12.2.8 TEMOTU PROVINCE

The lack of a road network is perhaps the most significant barrier to development in Temotu Province, particularly on Santa Cruz Island. There is a total of 103 km of roads, mainly on the western side of Santa Cruz. Most of these roads have deteriorated and are unusable. They need urgent maintenance. The only road on Reef Islands (Manuopo to Nialo) is no longer in use. Existing roads require urgent maintenance, and there is a need to extend the road network to allow access to areas of agricultural potential, particularly on Santa Cruz.

12.2.9 WESTERN PROVINCE

There are about 210 km of mostly unconnected and poorly maintained roads scattered among the larger islands of the province. The strategic Noro–Munda road, which links the two major population and infrastructure centres, is currently impassable because of a lack of maintenance. Repair of this road is the highest priority for road work in Western Province. Years of intensive logging in Western Province have left a significant network of unmaintained tracks. Some of these could be upgraded to improve access to areas of high agricultural potential for subsistence and commercial production, for example in inland New Georgia.

Unquestionably, the economic returns from a strategically placed road are high. However, the budgetary demands on such infrastructure are also high. The public finance challenge is how to adequately maintain and expand the road network in the face of budget constraints and a high level of public debt.

12.3 SHIPPING

The challenge of maintaining adequate shipping services is comparable to that of maintaining adequate road infrastructure. There has been a marked decline in shipping services to more remote areas. A frequent and reliable shipping service that the island community can link their harvesting schedule to is a prerequisite for agricultural development. Yet ships, shipping infrastructure and government-funded institutions for shipping have all declined significantly since independence. The current fleet is of poor quality, is high maintenance, is inefficient, and is ageing (Tony O'Dowd, Provincial Economic Adviser, Transportation, pers comm, November 2004).

Incentives are required for private sector investment in shipping; current fiscal and regulatory arrangements act as a disincentive to such investment. In particular, the current 43% fiscal duty applied to imported vessels and associated capital items acts as a major disincentive to investment in the industry. Another problem is the current policy of reserving inter-island shipping for businesses owned by Solomon Islanders.

The shipping industry needs significant incentives to better service remote locations. For these subsidies to be effective, regulations need to be strengthened and enforced to ensure that private shipping companies keep to their contracted shipping schedule for a particular route; if there is a breakdown or the vessel goes into dry dock, arrangements must be made for another vessel to take over the service for that duration — using subcontractors if necessary. Furthermore, in the absence of improvements in basic infrastructure, subsidies are unlikely to be effective. Most important is the provision of all-weather jetty facilities that will lower operating costs and encourage regular services. Tony O'Dowd notes:

There are approximately 125 provincial wharves and jetties, and about 90 anchorages utilised by inter-island shipping. There has been little or no effective maintenance of any of these facilities since they were constructed. In 2002, 71% of wharves and jetties were described in poor condition. In fact, most of the wharves are rapidly becoming inefficient and unsafe, and in many cases now unusable eg the international wharf at Yandina. (PowerPoint presentation 2004)

12.4 TELECOMMUNICATIONS

A key element in successful produce marketing is timely communication between growers, traders and buyers. Benefits from the great strides that have been made in information and telecommunications technology (ITC) are now starting to be felt in produce marketing in Pacific Island countries (PICs). A recent agricultural marketing policy study in Fiji described the impact of the communications 'revolution' on fresh produce marketing:

A Suva based taro exporter can now immediately be in contact with his Taveuni agent when an order is received, or cancelled, from his New Zealand buyer. The odds are that the agent, will in turn, be able to contact most of his growers by telephone. Similarly, the produce buyer from the Outrigger Hotel can call the manager of the Lokia Marketing Center and place his weekly order specialty fruit and vegetable. Even 5-years ago, such marketing linkages would not have been unthinkable. The telephone, and in particular the mobile phone, has enabled the requirements of the buyer to be more closely matched with what is supplied by the grower. It results in orderly marketing, which in turns results in expanded markets. (McGregor and Gonemaitabua 2002)

Rapidly changing ITC now makes it feasible to link all marketing agents nationwide. In many respects, SI lags well behind in adopting ITC, but it leads the PIC region in developing internet-based communications for remote areas. The United Nations Development Programme and other donors have helped to establish the email-based People First Network (PFN). Hubs of this network are situated in a number of isolated locations throughout the country. The PFN is said to be well used, although probably not much for commercial activity. The PFN's value in helping marketing has been limited by the absence of hubs in main provincial centres such as Auki and Gizo. It is recommended that the network be expanded to these provincial centres.

Agricultural marketing in SI would benefit greatly from an expansion of the mobile telephone network. However, given the costs and the area to be covered, significant expansion of the mobile phone network will be a long process. Other communication options to improve marketing linkages include the following:

- satellite telephones (which can be accessed anywhere but which have a high capital and operating cost)
- VHF radio (which has a low capital cost but is restricted to line of sight, although its range can be extended by an aerial mast)
- HF radio (which has a high capital cost, but which can be used over a long range)
- internet-based communication
- a combination of various communication technologies.

12.5 FARM INPUT SUPPLIES

Farm supply businesses play a critical role in the marketing chain. They can expect to be at the forefront of the introduction of new seed and planting material, which has been identified as a priority component of the recommendations in this study. In developed countries, the farm input suppliers tend to be the main source of technical and extension information for farmers. In SI, there is a complete absence of specialist farm supply businesses. This is surprising, given the importance of the agricultural sector. In comparison, the farming communities of Vanuatu and Tonga (which are comparable in size to SI) are well serviced by farm-supply businesses. Small farmers in the interior of Santo in Vanuatu are successfully growing off-season pineapples for sale at the Lugainville market. These farmers purchase their fruiting hormone from the Lugainville branch of Vanuatu Farm Supplies. Every effort needs to be made to promote farm-supply businesses in SI.

12.6 MARKET AND MARKETING INFORMATION

An efficient marketing system depends on the free flow of accurate information between sellers and buyers. Farmers need to know who the buyers are, what their quality requirements are and what prices are on offer. If market information can be provided cost-effectively, it has significant positive benefits for farmers, traders, exporters, and agricultural planners and policy makers.

The users of market information are farmers; traders and marketers; extension officers; and planners and policy makers. Some of their information needs are the same; others are quite different.

Farmers require answers to the following market and marketing information questions:

- Where can I sell produce (who are the buyers)?
- How do I get my produce to buyers and what does this cost?
- What are the quality requirements of the buyer?
- What price might I expect to receive?
- What are the seasonal patterns in prices, if any?
- What is required to produce for higher priced periods?
- What are my returns from growing the product? (The farmer needs to know the cost of producing the crop, particularly the labour inputs required.)
- What are the production and price risks involved?

SI farmers obtain some of this information for themselves. This usually relies on '*toktok blong road*' and can be quite misleading in situations where communication linkages are poor. An example is betel nut suppliers from the Guadalcanal Weather Coast. Betel nut prices on the Honiara market fluctuate widely in response to changes in interseasonal and intraseasonal availability. Villagers from Kolina indicate that Honiara market prices can vary from $80 to $300 per bag of rice (a 20-kg bag). At a price of $80, villagers suggest that a trip to Honiara to sell betel nut would be a significant loss-making exercise when transportation and living expenses are taken into account. At present, coming to Honiara to sell betel nut is a gamble: villagers will not know what the prices are until they arrive. The wrong decision results in a waste of resources and a loss of income. A farmer will base his decision to travel to Honiara on market information received from other villagers who have just returned from the market. Such information can be several weeks out of date and not reflect the current market situation.

Traders and marketers require answers to the following general questions:

- Who can supply the produce required by the market?
- How much of the produce is available and when?
- What selling prices can be expected?
- What are the seasonal patterns and trends in availability and prices?

For export markets, traders and marketers also require answers to the following questions:

- Who are the buyers of the product and how reliable are they?
- What are the market access requirements (quarantine, health, labelling, etc)?
- What transportation arrangements are available (freight capacity, frequency and voyage length)?
- What are the marketing costs (packing, transportation, quarantine treatment, etc)?
- Who are the competitors and what advantages do they have?

Appendix 3.8 outlines a proposal for a market information system for SI.

Table 12.1 ANZ loans by sector (month ending 29 October 2004)

SECTOR	OVERDRAFTS	OTHER LOANS	TOTAL LOANS	% OF TOTAL LOANS
Manufacturing	4 392	3 538	7 930	33.20
Agriculture				
Copra	0	47	47	0.20
Cocoa	0	76	76	0.32
Other agriculture	188	1 004	1 192	5.00
Subsector total	**188**	**1 127**	**1 315**	**5.50**
Forestry	407	1 477	1 884	7.90
Fisheries	117	85	202	0.80
Mining and quarry	0	0	0	0.00
Construction	798	3 262	4 060	17.00
Distribution	2 266	4 444	6 710	28.10
Tourism	202	436	638	2.70
Transportation	126	806	932	3.90
Entertainment and catering	36	0	36	0.20
Provincial and local government	160	0	160	0.70

Source: Data supplied by ANZ Honiara

12.7 FINANCE AND INVESTMENT

The agricultural sector faces a financing and investment crisis. Commercial banks have largely withdrawn from rural lending. Only 5.5% of ANZ's loans in SI are to the agricultural sector — of which only 0.20% are to copra and 0.32% to cocoa (see Table 12.1)

Without this investment, the sector will continue to languish, falling well below its potential to provide sustainable livelihoods for rural people. There are several examples of the financing and investment crisis, including:

- there is virtually no new investment in new marketing and agroprocessing ventures
- there is no working capital to help develop virgin coconut oil processing and exporting ventures
- there is no finance for copra purchases in isolated locations
- there is inadequate investment in cocoa fermentaries.

The findings of this situation analysis are that:

- commercial banks will not lend to the sector unless the loan can be fully secured
- most agribusiness assets have a low salvage value and thus are of limited value as security
- there is no equity investment or venture capital fund available
- no institution has filled the vacuum left by the demise of the Solomon Islands Development Bank (SIDB).

12.7.1 HOW TO ADEQUATELY FINANCE THE AGRIBUSINESS SECTOR

The financing and investment crisis for the rural sector predates the turmoil associated with the ethnic tension period and the demise of the SIDB. However, the problems have been compounded, particularly by the government's default on treasury bills issued to the commercial banks.

In the early 1990s, the Central Bank of the Solomon Islands (CBSI), in response to the difficulty faced by viable businesses in securing debt financing,

established an innovative loan guarantee scheme. Businesses submitted proposals to the commercial banks for appraisal of their commercial viability. If the bank deemed the proposal to be viable, the CBSI could be asked to guarantee 90% of the unsecured portion of the loan. The authors were unable to obtain actual figures on the performance of this loan guarantee scheme; however, the former CBSI governor (the architect of the scheme) indicates that the scheme was well subscribed and had a good success rate (Tony Hughes, former CBSI governor, pers comm, 2004). It has been suggested that some failures were due to a lack of due diligence on the part of the bank, rather than inadequacies in the scheme itself.

The CBSI's loan guarantee scheme still exists, although it has been five years since a commercial bank loan was guaranteed. However, there appears to be no knowledge of the scheme, even among senior managers of the commercial banks. The onus is now on the CBSI to again promote the scheme among the banking and business communities. The authors recommend that the existing arrangements be modified in two ways. First, the eligibility criteria should be expanded to include all SI-based businesses, regardless of whether they are indigenously owned or not. Second, there should be changes in the arrangements for pre- and post-shipment financing for exporters. A virgin coconut oil exporter indicated that the company can only secure 30-day overdraft coverage at an interest rate of 16%. The normal minimum payment period from shipment is 45 days. Under such arrangements, the exporting business faces serious cash flow difficulties, which cascade down to the rural suppliers of the enterprise.

No formal finance is available for the rural small- and micro-enterprise (SME) sector. On the positive side, small enterprises that have survived without access to formal finance have proven their resilience and have low debt levels (although informal obligations can be high). They have 'proven' their creditworthiness. However, overall, the lack of formal finance means that growth in the rural SME subsector has been seriously constrained and distorted, and is inefficient. This is reflected in the lack of SME involvement in produce wholesaling.

A commercial bank has expressed an interest in managing a loan program for viable rural enterprises, provided funds are made available from a third-party agency or agencies. This is in line with the SME financing facility, which the Commonwealth Secretariat is promoting to international finance institutions. This current proposal is being targeted at the European Investment Bank and domestic commercial banks in the African, Caribbean and Pacific Group of States. A major advantage of this type of proposal is that it uses the banking system to determine commercial viability, rather than leaving it to the discretion of aid donors to pick winners.

12.8 RECOMMENDATIONS

Based on the issues analysed above, improving the efficiency of marketing agriculture in SI requires that:

- roads are rehabilitated and upgraded
- the shipping industry is given incentives to better service remote locations
- the ITC network is expanded to service at least all the main provincial centres
- farm-supply businesses are promoted
- a market information system similar to the one outlined in Appendix 3.8 is developed
- the CBSI resumes and expands its loan guarantee scheme
- funds are made available for a loan scheme for rural areas, managed by a commercial bank.

Appendix 3.1 Financial analysis of copra production

Table A3.1.1 Financial analysis of copra production: flue-dried production (farmer plants 2 hectares of coconuts, invests in a flue drier and sells to a middleman; family provides labour)

PRODUCTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
Yield/ha (kg)	0	0	0	0	80	100	200	300	500	600	600	600	600	600	600	600	
Production (kg)	0	0	0	0	160	200	400	600	1000	1200	1200	1200	1200	1200	1200	1200	10 760
Sales — Price (grade 1) $1.2/kg on road	0	0	0	0	192	240	480	720	1200	1440	1440	1440	1440	1440	1440	1440	1901 620
Cash expenditure ($)	1300	0	0	0	2580	80	140	140	140	140	140	2640	140	140	140	140	402 300
Seedlings (260 @ $4 each plus $1 transport)	1300																
Drier materials (flue, copra wire, iron)					2500							2 500					
Copra knives and tools					80	80	140	140	140	140	140	140	140	140	140	140	
Gross margin	–1300	0	0	0	–2388	160	340	580	1060	1300	1300	–1200	1300	1300	1300	1300	5052
Labour (person-days)																	
Clearing	30																30.0
Cutting, lining, and digging holes	15																15.0
Planting	20																20.0
Weeding	20	20	10	5	5	5											65.0
Building the drier and carting materials				15													15.0
Cutting copra (230 kg green or 69 kg copra/ person/day)					2	3	6	9	14	17	17	17	17	17	17	17	155.9
Cutting and carting firewood (1 day/tonne of copra)					0.2	0.2	0.4	0.6	1.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	10.8

PRODUCTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
Drying copra (3 days/ tonne of copra)					0.5	0.5	1.2	1.8	3.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	32.3
Loading copra (1 day/3 tonnes)					0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.6
Subtotal	85.0	105.0	30.0	30.0	28.0	16.8	16.3	18.8	30.1	41.4	45.2	45.2	45.2	45.2	45.2	45.2	348
Summary performance measures																	
Average labour/year over 16 years	21.7																
Average annual gross margin/ha ($)	316																
Average return per person-day of labour ($)	15																
NPV @ r(i)10%	$4192																
Average NPV/ha ($)	$262																
NPV/person-day of labour ($)	$12.06																

NPV = net present value, r(i) = rate of interest

Source: Author's simulations

Appendix 3.2
Financial analyses of coconut oil production

(1) Direct micro-expeller (DME) method using hired labour (farmer hires labour, sells at the current buying price and produces 250 litres of coconut oil per week over 48 weeks)

(2) DME method using family labour (farmer uses family labour, sells at the current buying price and produces 250 litres of coconut oil per week over 48 weeks)

(3) Cold-press (Tinytech) method (farmer hires labour, sells at the current buying price and produces 2000 litres of coconut oil per week over 48 weeks)

Table A3.2.1 Financial analysis of copra production: DME method using hired labour (farmer hires labour, sells at the current buying price and produces 250 litres of coconut oil per week over 48 weeks)

YEAR	1	2	3	4	5	6	7	8	9	10	TOTAL
Revenue											
Amount of oil (litres) (250 litres/wk for 48 wks)	12 000	12 000	12 000	12 000	12 000	12 000	12 000	12 000	12 000	12 000	120 000
Revenue from sale at site (12 000 litres @ $8/litre) ($)	92 000	92 000	92 000	92 000	92 000	92 000	92 000	92 000	92 000	92 000	920 000
Revenue from sale at local market (500 litres @ $10/litre) ($)	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	50 000
Amount of meal (kg) (@ 91% of oil)	10 920	10 920	10 920	10 920	10 920	10 920	10 920	10 920	10 920	10 920	109 200
Revenue from sale at site (@ 50c/kg)	5 460	5 460	5 460	5 460	5 460	5 460	5 460	5 460	5 460	5 460	54 600
Total revenue	102 460	102 460	102 460	102 460	102 460	102 460	102 460	102 460	102 460	102 460	1 024 600
Costs ($)											
Operating costs											
No. of nuts required (@ 13 nuts/litre with a 5% rejection rate falling to 3% by year 3)	163 800	162 240	160 680	160 680	160 680	160 680	160 680	160 680	160 680	160 680	1 606 800
Purchased or imputed value of nuts (@ 20c/nut)	32 760	32 448	32 136	32 136	32 136	32 136	32 136	32 136	32 136	32 136	14 220 180
Diesel @5 litre/100 litre oil (@ $8/litre)	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	12 318 800
Repairs and maintenance (@10% of the capital cost)	7 060	7 060	7 060	7 060	7 060	7 060	7 060	7 060	7 060	7 060	669 500
Labour costs											
Contract labour (@ $2.83/litre oil shared between 6 people)	33 960	33 960	33 960	33 960	33 960	33 960	33 960	33 960	33 960	33 960	1 462 188
Supervisor wages (@ $90/wk)	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	731 094
Total operating cost	83 080	82 768	82 456	82 456	82 456	82 456	82 456	82 456	82 456	82 456	13 719 394

Capital costs											
YEAR	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**TOTAL**
DME unit (delivered)	45 000									45 000	90 000
Generator unit	20 600				20 600						41 200
Miscellaneous equipment and building materials	5 000									5 000	10 000
Total capital cost	70 600	0	0	0	20 600	0	0	0	0	50 000	141 200
Total cost	153 680	82 768	82 456	82 456	103 056	82 456	82 456	82 456	82 456	132 456	966 696
Summary performance measures											
Average NPV @r(i) 10% ($)	2 584										
IRR (%)	27										
Debt servicing capability ($)											
Repayment on $100 000 loan over 10 years	19 171	19 171	19 171	19 171	19 171	19 171	19 171	19 171	19 171	19 171	191 714
@ 14% interest											
Cash flow after debt serving	209	521	833	833	–19 767	833	833	833	833	–49 167	–63 210
Cumulative cash flow after debt servicing	209	729	1 562	2 395	–17 373	–16 540	–15 707	–14 875	–14 042	–63 210	
@ 8% interest	14 903	14 903	14 903	14 903	14 903	14 903	14 903	14 903	14 903	14 903	149 029
Cash flow after debt serving	4 477	4 789	5 101	5 101	–15 499	5 101	5 101	5 101	5 101	–44 899	–20 525
Cumulative cash flow after debt servicing	4 477	9 266	14 367	19 468	3 969	9 070	14 171	19 272	24 373	–20 525	

DME = direct micro-expeller; IRR = internal rate of return; NPV = net present value

Table A3.2.2 Financial analysis of copra production: DME method using family labour (farmer uses family labour, sells at the current buying price and produces 250 litres of coconut oil per week over 48 weeks)

YEAR	1	2	3	4	5	6	7	8	9	10	TOTAL
Revenue											
Litres produced (250 litres per week for 48 weeks)	12 000	12 000	12 000	12 000	12 000	12 000	12 000	12 000	12 000	12 000	120 000
12 000 litres @ $8/litre	92 000	92 000	92 000	92 000	92 000	92 000	92 000	92 000	92 000	92 000	920 000
500 litres @ $10/litre local market sales	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	50 000
kg meal produced @ 91% of oil	10 920	10 920	10 920	10 920	10 920	10 920	10 920	10 920	10 920	10 920	109 200
Revenue @ 50c/kg	5 460	5 460	5 460	5 460	5 460	5 460	5 460	5 460	5 460	5 460	54 600
Total revenue	102 460	102 460	102 460	102 460	102 460	102 460	102 460	102 460	102 460	102 460	1 024 600
Costs ($)											
Operating costs											
Nuts required @ 13 nuts per litre with 5% rejection rate falling to 3% by year 3	163 800	162 240	160 680	160 680	160 680	160 680	160 680	160 680	160 680	160 680	1 606 800
Purchased or imputed value of nuts @ 20c/nut	32 760	32 448	32 136	32 136	32 136	32 136	32 136	32 136	32 136	32 136	321 360
Diesel @5 litres/100 litres oil @ $8/litre	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	12 318 800
Repairs and maintenance (@10% of the capital cost)	7 060	7 060	7 060	7 060	7 060	7 060	7 060	7 060	7 060	7 060	669 500
Total nonlabour operating costs	44 620	44 308	43 996	43 996	43 996	43 996	43 996	43 996	43 996	43 996	13 719 394
Capital costs											
DME unit delivered	45 000									45 000	90 000
Generator unit	20 600				20 600						41 200
Miscellaneous equipment and building materials	5 000									5 000	10 000
Total capital cost	70 600	0	0	0	20 600	0	0	0	0	50 000	141 200
Total cost	**115 220**	**44 308**	**43 996**	**43 996**	**64 596**	**43 996**	**43 996**	**43 996**	**43 996**	**93 996**	**582 096**

YEAR	1	2	3	4	5	6	7	8	9	10	TOTAL
Cash flow before debt servicing	57 840	58 152	58 464	58 464	37 864	58 464	58 464	58 464	58 464	8 464	513 104
Cumulative cash flow	57 840	115 992	174 456	232 920	270 784	329 248	387 712	446 176	504 640	454 640	
Total gross margin	513 104										
Average annual gross margin ($)	51 310										
Labour inputs											
Person days 42 person-days per week (6 workers and one supervisor per shift)	2 016	2 016	2 016	2 016	2 016	2 016	2 016	2 016	2 016	2 016	20 160
Returns to family labour											
Average annual return per person-day of effort before debt servicing	$25										
Repayment on $100 000 loan (@8% interest) over 10 years	14 903	14 903	14 903	14 903	14 903	14 903	14 903	14 903	14 903	14 903	149 029
Cash flow after debt servicing	42 937	43 249	43 561	43 561	22 961	43 561	43 561	43 561	43 561	–6 439	364 075
Average annual gross margin after debt servicing ($)	36 407										
Average annual return to person-day of effort after debt servicing ($)	$18										
Repayment on $100 000 loan (@ 14% interest) over 10 years	19 171	19 171	19 171	19 171	19 171	19 171	19 171	19 171	19 171	19 171	191 714
Cash flow after debt servicing	38 669	38 981	39 293	39 293	18 693	39 293	39 293	39 293	39 293	–10 707	321 390
Average annual gross margin after debt servicing ($)	32 139										
Average annual return to person-day of effort after debt servicing ($)	$16										

DME = direct micro-expeller; IRR = internal rate of return

Table A3.2.3 Financial analysis of copra production: cold-press (Tinytech) method (farmer hires labour, sells at the current buying price and produces 2000 litres of coconut oil per week over 48 weeks)

YEAR	1	2	3	4	5	6	7	8	9	10	TOTAL
Revenue											
kg copra processed per year @ 8 bags/day for 310 days	186 000	186 000	186 000	186 000	186 000	186 000	186 000	186 000	186 000	186 000	1 860 000
Litres oil produced @ 52% extraction rate	96 720	96 720	96 720	96 720	96 720	96 720	96 720	96 720	96 720	96 720	967 200
Revenue @ $3/litre	290 160	290 160	290 160	290 160	290 160	290 160	290 160	290 160	290 160	290 160	2 901 600
kg meal produced	89 280	89 280	89 280	89 280	89 280	89 280	89 280	89 280	89 280	89 280	892 800
Revenue @ 40c/kg ex factory	44 640	44 640	44 640	44 640	44 640	44 640	44 640	44 640	44 640	44 640	446 400
Total revenue	334 800	334 800	334 800	334 800	334 800	334 800	334 800	334 800	334 800	334 800	3 348 000
Costs ($)											
Operating costs											
Copra purchased $1/kg delivered	186 000	186 000	186 000	186 000	186 000	186 000	186 000	186 000	186 000	186 000	1 860 000
Diesel @ 1 drum/month @ $890/drum	10 680	10 680	10 680	10 680	10 680	10 680	10 680	10 680	10 680	10 680	106 800
Repairs and maintenance (@ 10% of the capital cost)	12 500	12 500	12 500	12 500	12 500	12 500	12 500	12 500	12 500	12 500	125 000
Labour											
2 workers @ $150/fortnight	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	72 000
2 security guards @ $150/forthnight	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	72 000
1 leading hand @ $200/forthnight	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	45 000
Manager @ $300/forthnight	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	72 000
Total labour costs	26 100	26 100	26 100	26 100	26 100	26 100	26 100	26 100	26 100	26 100	261 000
Drum (200 litres) $250 drum used 4 times	30 225	30 225	30 225	30 225	30 225	30 225	30 225	30 225	30 225	30 225	302 250

Freight											
YEAR	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**TOTAL**
$10/drum to local jetty	4 836	4 836	4 836	4 836	4 836	4 836	4 836	4 836	4 836	4 836	48 360
$80/drum to Honiara	38 688	38 688	38 688	38 688	38 688	38 688	38 688	38 688	38 688	38 688	386 880
$40/drum return	19 344	19 344	19 344	19 344	19 344	19 344	19 344	19 344	19 344	19 344	193 440
Total freight	62 868	62 868	62 868	62 868	62 868	62 868	62 868	62 868	62 868	62 868	628 680
Bags for meal @ $5/40 kg bag	11 160	11 160	11 160	11 160	11 160	11 160	11 160	11 160	11 160	11 160	111 600
Total operating costs	339 533	339 533	339 533	339 533	339 533	339 533	339 533	339 533	339 533	339 533	3 395 330
Capital costs											
Tinytech mill installed including generator	75 000					20 000					95 000
Building, storage facilities and miscellaneous equipment	50 000										50 000
Total capital cost	125 000					20 000					145 000
Total cost	**464 533**	**339 533**	**339 533**	**339 533**	**339 533**	**359 533**	**339 533**	**339 533**	**339 533**	**339 533**	**3 540 330**
Cash flow before debt servicing	–129 733	–4 733	–4 733	–4 733	–4 733	–24 733	–4 733	–4 733	–4 733	–4 733	–192 330
Cumulative cash flow	–129 733	–134 466	–139 199	–143 932	–148 665	–173 398	–178 131	–182 864	–187 597	–187 597	
Total gross margin	–192 330										–192 330
Average annual gross margin	–19 233										–19 233
IRR	negative										
Debt servicing capability											
Repayment on $150 000 loan (@ 8% interest) over 10 years	22 354	22 354	22 354	22 354	22 354	22 354	22 354	22 354	22 354	22 354	223 544
Cash flow after debt servicing	–27 087	–27 087	–27 087	–27 087	–27 087	–47 087	–27 087	–27 087	–27 087	–27 087	–290 874
Cumulative cash flow after debt servicing	–27 087	–54 175	–81 262	–108 350	–135 437	–182 525	–209 612	–236 699	–263 787	–290 874	
Repayment on $125 000 loan (@ 14% interest) over 10 years	23 964	23 964	23 964	23 964	23 964	23 964	23 964	23 964	23 964	23 964	239 642
Cash flow after debt servicing	–153 697	–28 697	–28 697	–28 697	–28 697	–48 697	–28 697	–28 697	–28 697	–28 697	–431 972
Cumulative cash flow after debt servicing	–153 697	–182 394	–211 092	–239 789	–268 486	–317 183	–345 880	–374 578	–403 275	–431 972	

IRR = internal rate of return

Appendix 3.3
Financial analyses of cocoa production

(1) Financial analysis of cocoa production: Malaita smallholder grows 0.5 hectares of cocoa as part of a mixed food garden and sells wet beans on the road

(2) Financial analysis of cocoa production: Malaita smallholder grows 1.0 hectares of cocoa as part of a mixed food garden and sells dried beans on the road

Table A3.3.1 Financial analysis of cocoa production: Malaita smallholder grows 0.5 hectare of cocoa as part of a mixed food garden and sells wet beans on the road

YEAR		1	2	3	4	5	6	7	8	9	10	TOTAL
Revenue												
Production (kg wet per 0.5ha)		0	0	25	125	200	220	220	220	220	220	
Price per kg delivered to road ($)	$2											
Gross revenue ($)		0	0	50	250	400	440	440	440	440	440	
Variable costs ($)												
Seedlings (300)	$1	300										
Harvesting hook	$100				100							
Total variable costs		300	0	0	100	0	0	0	0	0	0	
Net revenue ($)		**–300**	**0**	**50**	**150**	**400**	**440**	**440**	**440**	**440**	**440**	**2 500**
Family labour (person-days)												
Land preparation		14.0	0	0	0	0	0	0	0	0	0	
Staking and cocoa seed planting		3.0	2.0	0	0	0	0	0	0	0	0	
Maintenance weeding		2.5	0	0	0	0	0	0	0	0	0	
Pruning		6.0	5.0	4.5	3.0	0	0	0	0	0	0	
Pest and disease control		0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
Harvesting and pod breaking		0	1.5	1.5	2.0	2.5	2.5	2.0	2.0	2.0	2.0	
Cartage to road		0	0	0	0.5	1.5	2.0	3.0	3.0	3.0	3.0	
Total labour days		**25.5**	**9.5**	**7.5**	**7.0**	**5.5**	**6.0**	**6.5**	**6.5**	**6.5**	**6.5**	**87**
Average labour per year	9											
Average gross margin from cocoa per area	$250											
Average return for family day of labour	$28.74											

Table A3.3.2 Financial analysis of cocoa production: Malaita smallholder grows 1.0 hectare of cocoa as part of a mixed food garden and sells dried beans on the road

YEAR		1	2	3	4	5	6	7	8	9	10	TOTAL
Revenue												
Production (kg)		0	0	30	250	350	350	350	350	350	350	2380
Price per kg at roadside ($)	$5											
Gross revenue ($)		0	0	150	1250	1750	1750	1750	1750	1750	1750	11900
Cash expenditure ($)												
Seedlings (1000/ha)	$1	1000										1000
Bags	$7	0	0	3.23	26.92	37.69	37.69	37.69	37.69	37.69	37.69	256
Harvesting hook	$100			100		200						300
Drier materials				1000				1000				2000
Total cash expenditure		1000	0	1103.23	26.92	237.69	37.69	1037.69	37.69	37.69	37.69	3556
Net revenue ($)		**–1000**	**0**	**–953.23**	**1223.08**	**1512.31**	**1712.31**	**712.31**	**1712.31**	**1712.31**	**1712.31**	**8 344**
Household labour input												**0**
Land preparation		14										14
Shade tree planting and maintenance		6	4									10
Staking and cocoa seed planting		5										5
Maintenance weeding		6	5	9	6							26
Pruning			2	4	4	4	3	3	3	3	3	29
Pest and disease control			3	2	3	4	3	3	3	3	3	27
Shade tree thinning			10	6	6	6						28
Harvesting and pod breaking					4	7	12	12	12	12	12	71
Fermentation and drying					2	5	9	9	9	9	9	52
Cartage of cocoa to road					1	2	2	2	2	2	2	13
Total labour input		**31**	**24**	**21**	**26**	**28**	**29**	**29**	**29**	**29**	**29**	**275**
Average labour per year (person-days)	27.5											
Average gross margin per area (1 ha)	$834											
Average return for family day of labour ($)	$30											

Appendix 3.4 Applied agricultural research: a long-term strategy

MORGAN WAIRIU

Appendix 3.4 describes how applied or adaptive agricultural research can be used as a long-term strategy to improve food production and create a sustainable rural livelihood in Solomon Islands (SI).

Villagers in SI have major concerns about declining crop yields due to factors such as declines in soil fertility, pest and disease damage, and lack of improved and disease-resistant varieties. These issues were raised in almost all provinces during the authors' consultation visits. Addressing these constraints would require long-term research and a major commitment to create research infrastructure, as well as highly skilled scientists. However, SI has higher priorities than the concerns listed above, and a limited capacity to address them, so an approach involving long-term research, research infrastructure and skilled scientists is not suitable. Nevertheless, there is an immediate need to generate appropriate technologies to maintain soil fertility, to control pests and diseases at the village level, and to carry out on-farm evaluation of improved varieties. This can be done through applied or adaptive research. Such an approach reinforces the capacities of research and extension staff as well as selected farmers. It also allows for the effective design and implementation of appropriate participatory on-farm demonstrations, and for the evaluation of technologies for improved food production. Initial support is required to develop and design appropriate on-farm research.

Participatory approaches have been introduced through a number of donor-supported projects, including the following:

- the Farmers Support Programme, which improved the mobility of extension staff with the objective of increasing food crop production
- the Micro Project, which involved providing inputs to farmers free of charge
- the International Board for Soil Research and Soil Management, which focused on improving crop yields on sloping land
- the Pacific Regional Agricultural Program, which involved improving farming systems.

Unfortunately, the projects were implemented in isolation without a long-term strategy to ensure continuity and sustainability, and they were not problem oriented.

Farmers in SI have had centuries of experience in growing food crops for family consumption. Unfortunately, research has not paid a lot of attention to improving food crops, although it is obvious that extension work needs to help farmers increase their levels of food production. Because food crop production has received little attention on the part of 'outsiders' (for example, researchers and extension staff), it is obvious that if farmers are to be helped, it will be necessary to build on their skills and knowledge. This will require the use of participatory techniques.

The need for an efficient conservation cropping system for steep land management is an example of a specific requirement. Technical support is required to assist village or tribal groups with land evaluation and land-use planning, and pest and disease control and management. In this approach, research directly assists villagers to identify sound practices that can be done in cooperation with other groups. Applied or adaptive research will be associated with improved information flow among villagers; benefits should be considerable and research control will become acceptable.

Assistance should involve technical advisory support from the Australian Centre for International Agricultural Research to assist the Department of Agriculture and Livestock, nongovernment organisations and farmers to design applied or adaptive and problem-oriented research plans addressing issues relating to soil fertility and pest and disease problems. The plans should involve practical steps for diagnosing farmer problems or constraints and for researching problems on farm.

Appendix 3.5 Proposal to establish a quarantine greenhouse

MORGAN WAIRIU

An inspection facility, such as a post-entry quarantine (PEQ) greenhouse, is needed if Solomon Islands (SI) is going to import improved crop varieties, ornamentals and improved crops of economic significance, such as clonal cocoa. At present, there is no such inspection facility in the country, so plant and animal materials are not allowed to be imported into SI. An inspection facility should be managed either by the Department of Agriculture and Livestock (DAL) or by a private entity with DAL plant protection staff monitoring and evaluating imported materials. The inspection facility should inspect and treat imported plant and animal materials, and ensure that the World Trade Organization phytosanitary standards for importing planting materials are complied with.

The inspection facility should include a screened greenhouse and a laboratory for surveillance and preparation. Construction would require the following materials:

- structure (timber, cement) = $213 600
- five rolls screen mesh = $111 240
- furniture and equipment = $100 000

The PEQ greenhouse will:

- facilitate the importation of improved planting materials and animals to increase food production and address food security
- control potential pests and diseases, as materials will be screened
- build local capacity in monitoring and evaluating materials following set rules and standards.

The inspection facility would be based on a user-pays system to ensure that the service is reliable, efficient and sustainable. Support should be required only during the initial construction, and the inspection facility should take care of its running costs.

Appendix 3.6
Financial analysis of ngali nut production

Financial analysis of ngali nut production: a farmer plants one hectare of ngali nuts and sells them to an agent

Table A3.6.1 Financial analysis of ngali nut production (farmer plants 1 hectare of ngali nuts and sells them to an agent)

Initial number of trees	625															
Percentage of unproductive male trees	5															
Total number bearing trees	594															
Nut price $/kg dried NIS Gizo	$1.40															
Fuel wood price $/$m^3$	$2															
Poles and sawn timber price $/$m^3$	$100															
YEAR	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**25**
Number of trees	625	625	625	625	625	625	412	412	412	206	206	206	206	206	206	206
Percentage of flowering trees	0	0	0	0	5	10	20	40	80	95	95	95	95	95	95	95
Number of bearing trees (ie productive trees)					31	63	82	165	330	196	196	196	196	196	196	196
Yield of fruit (kg / bearing tree / yr)					5	13	23	30	40	48	58	63	75	83	93	180
Yield of dried NIS (kg / bearing tree / yr)					2	5	9	12	16	19	23	25	30	33	37	72
Fruit production (kg)					156	781	1 854	4 944	13 184	9 296	11 253	12 231	14 678	16 145	18 102	35 226
Nut production kg dried NIS					63	313	742	1 978	5 274	3 718	4 501	4 893	5 871	6 458	7 241	14 090
Timber production																
Fuel wood (m^3)							3			4						
Poles and sawn timber (m^3)										7						
Gross revenue (nuts)					88	438	1 039	2 769	7 384	5 205	6 301	6 850	8 219	9 041	10 137	19 726
Gross revenue (timber)							6			708						
Total gross revenue	**0**				**88**	**438**	**1 045**	**2 769**	**7 384**	**5 913**	**6 301**	**6 850**	**8 219**	**9 041**	**10 137**	**19 726**
Cash expenditure	**0**		**–**		**44**	**219**	**519**	**1384**	**1 477**	**1 041**	**1 260**	**1 370**	**1 644**	**1 808**	**2 027**	**3 945**
Seeding polybags (@ $1.70 each)	1 063															
Bags (assumed supplied by buyer)																
Transportation to buyer ($14/50 kg bag)					44	219	519	1384	1 477	1 041	1 260	1 370	1 644	1 808	2 027	3 945
Net revenue	**–1 063**		**–**		**45**	**220**	**526**	**1 385**	**5 907**	**4 872**	**5 041**	**5 480**	**6 576**	**7 233**	**8 110**	**15 781**

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	25
Family labour (person-days)																
Selecting and sowing seed nuts	2															
Nursery transplanting in polybags	10															
Seedling maintenance	2															
Clearing for planting	20				10											
Cutting and lining	10															
Digging holes and planting	10															
Weeding	15	15	10	10	7	7	5	5	5	5	5	5	5	5	5	5
Pruning			15	15	10	10	5	5	5	5	5	5	5	5	5	5
Culling trees (timber buyer cuts trees)																
Gathering and heaping nuts (250 kg fruit/day)						1	3	7	20	53	37	45	49	59	65	72
Removing fruit from nut (500 kg fruit/day)						0.5	2	4	10	26	19	23	24	29	32	36
Building drier					3			4			4			4		
Drying					0.5	0.5	0.5	10	26	19	23	24	29	32	36	70
Bagging and cartage					0.5	0.5	0.5	1	1	1	2	2	2	3	3	3
Subtotal	**69**	**15**	**25**	**25**	**32**	**23**	**22**	**55**	**116**	**85**	**106**	**110**	**129**	**146**	**158**	**295**
Total net revenue ($)	202 141															
Net present value of total net revenue; r(i) = 8%	43 800															
Average annual gross margin per ha ($)	8 086															
Total labour input	3 211															
Average annual labour input	128															
Returns per family day of labour ($)	63															

NIS = nut-in-shell

Appendix 3.7 Financial analysis of vanilla production

Table A3.7.1 Projected returns from 0.5 hectares of vanilla (1000 vines)

YEAR	1	2	3	4	5	6	7	8	9	10	TOTAL
Production (kg)											
Green vanilla	0	0	0	400	500	600	600	600	600	600	3900
Cured vanilla	0	0	0	80	100	120	120	120	120	120	780
Income at sale price of $170/kg ($)				**13 600**	**17 000**	**20 400**	**20 400**	**20 400**	**20 400**	**20 400**	**132 600**
Cash expenditure ($)											
Vanilla cuttings (1000 @ $2.50 each)	2 500										
Curing equipment (cooking pot, strainer, curing box, thermometer, water container)				5 000				5 000			
Materials for drier (black plastic, cement, iron for ridge cap)				1 200				1 200			
Materials for storage (storage containers, wax paper and shrink wrap)				1 200				1 200			
Total cash expenditure ($)	**2 500**	**0**	**0**	**7 400**	**0**	**0**	**0**	**7 400**	**0**	**0**	**17 300**
Cash flow	**–2 500**	**0**	**0**	**6 200**	**17 000**	**20 400**	**20 400**	**13 000**	**20 400**	**20 400**	**115 300**
Labour inputs (person-days)											
Clearing	10										
Cutting fence posts	5										
Cutting and planting support trees	6										
Planting vines	6										
Mulching	10	15	15	15	15	15	15	15	15	15	145
Weeding	3	12	12	12	12	12	12	12	12	12	111

YEAR	1	2	3	4	5	6	7	8	9	10	TOTAL
Looping		5	5	5	5	5	5	5	5	5	45
Pruning		5	5	5	5	5	5	5	5	5	45
Pollinating		3	10	20	20	20	20	20	20	20	153
Harvesting		1	3	6	6	6	6	6	6	6	46
Security				3	3	3	3	3	3	3	21
Building curing house				10							10
Building and rebuilding dryer				5	5	5	5	5	5	5	35
Curing and drying				35	35	35	35	35	35	35	245
In-box curing				8	8	8	8	8	8	8	56
Packing				1	2	2	2	2	2	2	13
Subtotal	**40**	**41**	**50**	**125**	**116**	**116**	**116**	**116**	**116**	**116**	**952**
Average annual labour input (person-days)			**95**								
Average annual gross margin ($)	**11 530**										
Average return per day of effort ($)	**121**										

Appendix 3.8
A proposal for a Solomon Islands market information system

An efficient marketing system depends on the free flow of accurate information between sellers and buyers. Farmers need to know who the buyers are, what their quality requirements are and the prices on offer. If market information can be provided cost effectively, it has significant positive benefits for farmers, traders, exporters, and agricultural planners and policy makers. The market and marketing information required by farmers includes:

- where and who are the buyers
- how to get the produce to the buyer and at what cost
- what are the quality requirements of the buyer
- what are the prices farmers can expect for their products
- what are the seasonal patterns in prices
- what are the requirements to produce during higher-priced periods
- what are the returns from growing the product (the farmer needs to know the cost of producing the crop — in particular the labour inputs required)
- what are the risks involved in production and marketing.

Solomon Islands (SI) farmers obtain some of this information for themselves. This usually relies on *'toktok blong road'* and can be quite misleading in situations where communication linkages are poor. An example is the effect of market price variation for betel nut on suppliers from the Guadalcanal Weather Coast. Betel nut prices on the Honiara market fluctuate widely in response to changes in inter- and intraseasonal availability. Villagers from Kolina indicate that the Honiara market prices can vary from $80 to $200–300/bag (20 kg rice bag). At a price of $80 they suggest that a trip to Honiara to sell betel nut would be a significant loss-making exercise when transportation and living expenses are taken into account. At present, coming to Honiara to sell betel nut is a gamble for them — they will not know what the prices are until they arrive. The wrong decision will result in a waste of resources and loss of income. Currently, a farmer will base his decision to travel to Honiara on market information received from other villagers who have just returned from the market. However, such information can be several weeks out of date and not reflect the current market situation.

The following is proposed to improve the market information situation in SI:

- SI should adopt a market information system (MIS). This should be done under the auspices of the Commodities Export Marketing Authority (CEMA) as part of its new regulatory and facilitating mandate.
- The collection and collation of market information should be subcontracted. It is suggested that this be put out to tender.
- The Food and Agriculture Organization of the United Nations' (FAO) computerised MIS data collection and reporting system should be adapted for SI. It should initially be applied to the Honiara market and later extended to the main regional markets such as Auki, Gizo and Munda. The survey that will supply the information should include all the main staples, fruit and vegetables, betel nut and selected marine products.
- Twice weekly price and supply information should be broadcast on the radio, published in the newspaper and disseminated by the People First Network (PFN) email network. A weekly market summary should be presented on radio, in the newspaper and via the PFN. Marketing features should be regularly presented on the radio and the newspaper.

- Fortnightly reports on relevant international prices (eg copra, coconut oil, cocoa) and relevant transportation cost data (eg shipping cost to Australia and European ports) should be distributed to stakeholders and the media (radio and newspaper) in a readily usable form.
- Extension officers should be trained in interpreting market information and transferring this information to farmers in an accurate and understandable form.
- A comprehensive, up-to-date farm management manual for SI should be prepared. The manual will reflect the realities of SI integrated cropping systems, and will place particular emphasis on returns to labour input. The manual will cover marketing and value-adding (processing) enterprises and activities. A system will be established for the systematic updating of the farm management manual to ensure sustainability. The budgets will be linked to the relevant market information. A participatory approach will be adopted in the preparation of the manual and will involve farmers, marketers (domestic and export), extension officers, nongovernment organisations (NGOs) and agriculturalists.
- Training in the form of workshops should be provided to inform extension officers, NGOs, Rural Training Centres and marketers how to use these manuals. A particular emphasis of the workshops will be to link farm management to market information and vice versa. An important resource for these training programs will be the recently completed FAO manual: *No Gud Bisnes Bagarup: Helping Small Farmers in the Pacific to Make Wise Farm Management and Marketing Decisions. An Analytical Tool Box* (FAO 2005). This manual will be modified where appropriate for the conditions of SI agriculture.

Steps for the implementation of these proposals are:

- A market information/marketing extension specialist will be appointed to work with the MIS project for a period of five months (2 x 2.5 months). He/she would be supported by an MIS computer software specialist (two months input).
- The specialist will review the market data collected by the Central Bank and the Department of Statistics with a view to expanding the commodity and geographical coverage. The MIS director, with assistance from the marketing specialist, will formulate a proposal to integrate data currently collected by these agencies into the MIS.
- The participants will include representatives of farmers and agribusiness, marketers and exporters, representatives of shipping companies, NGOs that work with farmers, selected extension officers, CEMA, and DAL. Representatives of the media and the PFN would also participate.
- The computerised MIS, utilising software developed by the FAO, adapted for SI, installed and made operational. Staff from CEMA and the organisation contracted to collect the data will be trained in the operation of the system.
- Systematic links with international databases will be established and the data summarised and presented in a form that is usable by the MIS clients. These databases include Public Ledger (copra, coconut oil and cocoa beans), International Cocoa Organisation (cocoa beans), ED&F Man (cocoa products), Asia Pacific Coconut Organisation (coconut products), South Pacific Islands Trade and Investment Commission (SPITIC) Auckland, and SPITIC Sydney. Training programs for extension staff (both DAL and NGO) in understanding and using market information will be conducted. Representatives of farmers, marketers and agribusiness will participate in this training.

- The marketing specialist working with MIS staff will prepare trial marketing information material for radio and newspaper dissemination. The usefulness of this material will be tested with farmers, marketers and agribusiness. Depending on the feedback obtained, the material will be modified. An ongoing product of the MIS will be regular market information features on radio and in the newspaper.
- A consultative committee (involving farmers, marketers, agribusiness and DAL) will be established to provide an ongoing assessment of the value of market information that is being collected and the way it is being disseminated, and make recommendations for its improvement.

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