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Coconut markets for PNG

Technical Report 113

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Table of Contents

Acronyms

Abbreviation	Description
ANL	Australia New Zealand Lines
APCC	Asian & Pacific Coconut Community
AU	Australian Dollar
BM	Bismarck Maritime
CCIPNG	Cocoa Coconut Institute of Papua New Guinea
CEL	Consort Express Lines
CMB	Copra Marketing Board
CNO	Copra Oil
COPM	Coconut Oil Production Madang
CPL	Coconut Products Limited
DME	Direct Micro Expeller
FOB	Freight On Board
HACCP	Hazard Analysis & Critical Control Points
HIV	Human Immunodeficiency Virus
HSC	Harmonised System Classification
HVCP IWG	High-valued Coconut Products Industry Working Group
ICCC	Independent Consumer and Competition Commission
KIK	Kokonas Indastri Koporesen
MT	Metric Tonnes, tonnes
PGK	Papua New Guinean Kina (Kina)
PHAMA	Pacific Horticultural & Agricultural Market Access Program
RBD	Refined/Bleached/Deodorized
SME	Small to Medium Enterprise
USD	United States Dollar
VCO	Virgin Coconut Oil

Executive Summary

The objective of this report is to analyse the capacity of the coconut industry in Papua New Guinea (PNG) and how it could potentially grow exports of high-value added products into Australia and New Zealand, US, EU, Japan and China.

The history of the PNG coconut industry of copra and crude coconut oil has been one of decline since the 1980's for a variety of production and market structure reasons.

In PNG and internationally, there is a growing demand for high-value coconut products (HVCPs) such as white copra & its derivatives – body oils, lotions & creams, coconut soap, virgin coconut oil (VCO), coconut cooking oil, coconut water (processed & green tender nut), and coconut fibre products. In Europe, U.S., Japan and Australasia, growth in demand for VCO has been driven by its health and cosmetic properties. However, current exports by PNG companies of HVCPs are very limited.

In our discussions with importers of coconut products in Australia and New Zealand, their perceptions of PNG as a source of high-value products such as coconut water and VCO ranged from neutral to lacking knowledge, to somewhat negative. Several Asian countries[1] have large scale HVCP production entering the international market for these products, and price competition is becoming stronger with price falls likely despite projected continued demand growth in several markets.

This report concludes that the PNG production of processed high-value coconut products does not currently match the capability of exporters such as Vietnam, Indonesia and Sri Lanka to supply large volumes to markets such as Australia and New Zealand. PNG exporters will find it difficult to compete in the production of VCO as a bulk item for subsequent re-packaging and distribution in destination markets, nor are they likely to succeed in supplying directly the extremely price conscious supermarkets in Australia and New Zealand.

It is recommended that PNG focus on producing high quality VCO for speciality markets and online sales in Australia, U.S., Europe and Japan, and to a lesser extent New Zealand. To tap into these speciality markets, HACCP accreditation is a must, organic certification is preferable and packaging and labelling must be to an international standard. There may be opportunities to develop branding around the product as PNG and/or Pacific origin.

As a result, it is recommended that PNG Small Medium Enterprises (SMEs) focus on improvements in VCO production, including improving quality though standards compliance (with support via a peak body such as the Konkanas Indastri Koporesen - KIK), and developing sales to overseas speciality retailers in the first case to manage retail volume and margin constraints. Support will be required to improve product standards and assist with establishing contact and potential business relationships between identified importers in Australia and New Zealand willing to talk through their requirements with Papua New Guinea exporters. A set of trade contacts is provided in Appendix B.

A full set of detailed recommendations is provided in the body of the report, these were validated by an outcomes workshop in Port Moresby on 26 October 2016 at which the following priority actions were agreed for support by KIK, Industry and PHAMA to support improvements in quality, and support marketing initiatives for SMEs.

The activities are:

1. **Development of a Marketing Plan for HVCP SME producers**
    - Based on findings of the market study, KIK to work with interested SMEs to develop a plan for improved domestic sales and export. Scope to cover potential marketing tools for SMEs & KIK, awareness programs on benefits of HVCP's, branding and distribution channels.
    - Develop Supplier and Buyer Guide (direct responsibility of the KIK Marketing Unit) from the contacts in the market study.

[1] Indonesia, Sri Lanka, Thailand, Vietnam, India

2. Standards and Quality

National Standards

- KIK to progress development and adoption of national standards for selected coconut products e.g. VCO, cooking oils, soaps based on recognized APCC standards. PHAMA to consider support to assist in associated consultative processes, awareness activities and standards rollout.

Laboratory quality testing capacity

- KIK to progress updating capacity to conduct appropriate testing to support implementation of quality standards.

Hazard Analysis Critical Control Points (HACCP)

- KIK to progress initial HACCP training and gap assessments with industry.
- PHAMA to consider potential support for HACCP accreditation processes by selected SMEs, and for this to be a capacity building exercise for KIK and other agencies erg NISIT.

Organic Certification

- PHAMA and KIK to clarify interest amongst export ready SMEs to obtain organic certification to meet market/customer requirements. PHAMA to consider support for organic certification processes for SMEs.

3. Market Access and Commercial Requirements

- KIK and PHAMA to assist interested exporters to clarify and confirm relevant import requirements (food, composition, labelling) and commercial standards for nominated destination markets.

4. Trade Samples & Trade Visits

- To link producers with potential buyers and to confirm compliance with market standards, PHAMA could support facilitation of trade samples, and potential trade visits by interested exporters/export ready producers to identify and establish overseas buyer relationships.

5. Industry Capacity Building

As part of the broader marketing initiative and quality improvements, KIK, PHAMA and other potential partners are to consider support for capacity building of the industry including:

- Development of online marketing (websites and E-commerce platforms) presence and tools.
- Business mentoring support (Business planning, financial literacy, trade contracts negotiation, book keeping, entrepreneurship skills).
- Appropriate processing technology training improvements.

1.0 Introduction

1.1 Background

Coconut products are the fourth largest agricultural export commodity for Papua New Guinea (PNG). They generate export returns averaging K124 million annually (AU$79 million). They are an important contributor to the rural economy with over 460,000 households engaged in coconut activities largely for cash cropping or own use. Overall, agriculture contributes to about 25% of the country's GDP and over 85% of the population is involved in farming and agriculture.

The coconut industry has the potential to contribute more to the value of the agricultural sector and this report describes the industry and its opportunities and constraints and suggests a series of steps to growing markets for high-value coconut products.

The industry exports predominantly traditional coconut products including Copra, Copra Oil (CNO) and Copra meal. Copra production has declined significantly due to international price volatility and the failure in the past to manage or regulate local prices to protect the industry from this volatility.

In recent years, the industry has started promoting the processing and sale of high-value coconut products for both domestic and export markets with an aim to receiving higher and more sustainable returns and so expanding the production of coconut products.

The demand for high-value coconut products in domestic and global markets has increased in recent years. This has been driven in large part by products, which are now regarded as being beneficial to health and wellness. Packaged coconut water for example has become a lucrative retail industry, competing with carbonated drinks and has attracted large beverage producers to gain market share in this product.

In addition, Virgin Coconut Oil (VCO)[2] is becoming increasingly valued as a healthy product for cooking and as a constituent in cosmetic products. In Section 3.3, we have modelled the option for a Small to Medium Enterprise (SME) to enter the VCO market with an emphasis on export.

PNG's coconut industry has a large production base which is currently under-utilised and there is opportunity to benefit from the market growth for higher value products. Small-scale producers can benefit through product diversification, technology improvements and enhanced market access.

The Kokonas Indastri Koporesen (KIK) has taken a proactive approach in promoting value addition of coconuts by partnering with coconut SMEs who have started local processing of high-value coconut products. Some of these locally produced high-value products are already sold both in the domestic market and/or are exported.

Market development for high-value products for PNG producers and exporters is now a priority for KIK and the industry.

KIK has asked PHAMA for assistance to conduct a study to assess the potential for export of value added coconut products into the Australia, New Zealand, the U.S, EU, Japan and China.

It is intended that findings will inform market development work by KIK, PHAMA and other development players and enable SMEs in the industry to better understand how to realise market opportunities through a clear understanding of market requirements.

1.2 Scope of this report

The scope of this report as specified by PHAMA is to:

- Collect baseline data on current PNG coconut product production, producers and exporters to determine export capacity and current pricing received;
- Assess the size and detail the potential export market in the US, EU, Japan, Australia, NZ and China for selected PNG coconut products; virgin coconut oil, white copra & its derivatives –

[2] Refer to Appendix A for the definition of VCO.

body oils, lotions & creams; coconut soap; and coconut cooking oil; coconut water (processed & green tender nut), and coconut fibre products;
- Determine the economic and technical viability of PNG exports to the target markets. We have made qualitative assessments of the quality of PNG coconut products, their process control and packaging;
- Identify any specific market development opportunities; and
- Recommend any appropriate actions to meet those identified market opportunities including any appropriate supply chain development and market development work.

While the scope of this report is focused on PNG exports, we have also carried out a brief analysis of domestic sales, and have concluded that domestic sales are a critical part of the development of the industry and the SMEs that make up most of the industry.

Successful supply to the domestic market enables a business to develop an initial cash flow while developing both their sales and production capabilities. This then puts them in a stronger position to expand into the export market. This lower risk approach will increase a company's likelihood of engaging with export markets successfully.

1.3 Study methodology

Gravelroad was commissioned by PHAMA to carry out the work described in Section 1.2.

We have:

1) Carried out background research using information provided by PHAMA, KIK and from other international sources.
2) Inspected the production facilities and met with producers of coconut oil and coconut oil products in PNG:
    a. Prior to each meeting, producers were asked to complete a survey.
    b. Gravelroad then met with a representative of each participating company and visited their production site – a total of 15 are listed in Table 1 in the next section. Gaps in the data collected in the questionnaire were clarified and resolved wherever possible. It should be noted that some respondents were reluctant to provide all the information sought, because of their view of the commercial sensitivity of the information and competitive risk that they assumed would result. This caution is not uncommon in gathering information to help understand markets, and we have made allowances for the gaps in information that have resulted.
3) Surveyed products in retail outlets of PNG, Australia and New Zealand - this involved visiting retail outlets and recording coconut products on the shelves. The brand name, manufacturer, country of origination and retail price of each product was recorded.
4) Made contact with a sample of companies in countries that could potentially import PNG products. Initial contact was made by phone, a questionnaire was sent to each company, and follow up phone calls were then made.

1.4 Study limitations

The study focused mainly on VCO as the field visits revealed that it was the main product produced by the SMEs and some degree of expertise has been acquired over time. However, we noticed that production data in some cases were not kept and producers were providing their best estimates.

The copra industry is required by legislation to provide production and export data to KIK. The VCO industry is not required to do so and therefore data for this industry is not readily available. Sri Lanka is the only country that has a HSC code for VCO. VCO tends to be included under coconut (copra) oil and therefore it was very difficult to separate out VCO from coconut oil for the markets under review and for PNG. For PNG, domestic production and export data for VCO was obtained from the SME survey. Customs PNG was generous enough to provide a greater level of detail for import data for

PNG that specifically identified VCO that was included under copra oil. Gravelroad was fortunate to obtain private commercial VCO data from QYR Food Research Center for Australia, Europe, Japan and the US.

The study budget did not allow for travel to the other markets other than Australia and New Zealand[3].

1.5 PNG organisations consulted

Table 1: List organisations consulted

Coconut Market Study - List of Organisations/SMEs Visited				
Name of Organisation / SME	**Location**	**Manager/Director**	**Phone/Cell**	**Email Address**
Foundation of Women in Agricultural Development (FOWIAD) VCO Producer	Maprik, East Sepik Province	Monica Otto	(+675) 7209-7915	jirjeddah@gmail.com.pg
Weni & Mendol Investments Ltd VCO producer	Wewak, East Sepik province	Anton Areka	(+675) 7095-2620	aareka@global.net.pg
Globe Manufacturing Ltd Copra Oil producer / exporter	Madang, Madang Province	Dananjaya Senaratha	(+675) 422-0448/ 7078-5880	dananjayas@globepng.com.pg
Pristine Co.101 (Madang) Copra Oil producer / exporter	Madang, Madang Province			pristine101madang@gmail.com.pg
RM Sarikey Bio Products VCO producer	Madang, Madang Province	Leonard Sarikey Kaptigau	(+675) 7160-3399	leonardsari1234@gmail.com
Kulili Estates Copra producer / buyer	Karkar Island, Madang Province	Derek Middleton	(+675) 7102-5312	derek.wadau@global.net.pg
Aikane Ltd VCO producer	Rubio Plantation, New Ireland Province	Shane Clark	(+675) 7216-6566	shaneclark@newirelandsurf.com.pg
Emirau Marine Products Currently not a VCO producer	Kavieng, New Ireland Province	Reinhard Mangels	(+675) 7264-4191	reinhardmangels@gmail.com.pg
New Innovations Currently not a VCO producer	Port Moresby, NCD	Philip Ravusiro		pjravusiro@yahoo.com

[3] The mere presence of Gravelroad in Australia and New Zealand made it easier for the consultants in both countries.

Coconut Market Study - List of Organisations/SMEs Visited				
Poti Family Support Services VCO producer	Kavieng, New Ireland Province	Kula Daslogo	(+675) 7265-3649	kuladaslogo@gmail.com.pg
Tropic Fronds VCO producer / exporter	Kerevat, East New Britain Province	Emilton Warapit (Factory Supervisor)	(+675) 982-9181/ 7289-7970	emilwarapit@gmail.com.pg
Amruqa VCO producer / exporter	Gazelle, East new Britain Province	Ian Sexton Sharmayne Ryan	(+675) 7333-9040/ 7037-9432	isexton.consult@gmail.com.pg mayne.ryan@gmail.com.pg
Pacific Lama Traders Copra exporter	Kokopo, East New Britain	John D. Seeto	(+675) 982-5200/ 7283-1633	jdseeto@gmail.com.pg
Rabaul Virgin Coconut Oil VCO producer	Rabaul, East New Britain	Ephraim Jubilee (Applied Chemist)	(+675) 7906-9680	ephy.jubilee0007@gmail.com.pg
East New Britain Development Cooperative Copra exporter	Kokopo, East New Britain	Roland Kerina	(+675) 7199-2311	N/A
WR Carpenters (CPL) Copra exporter	Rabaul, East New Britain	Arjun Sanadi	(+675) 982-1844/ 7208-7014	N/A
Maxtone Haus VCO producer / exporter	Port Moresby, NCD	Ernestine Kong	(+675) 7960-8385	maxtonehaus@gmail.com.pg
Aroma Coconut Products Ltd VCO producer	Maopa Village, Central Province	Geno Lamar	(+675) 7158-0045	gee2lamar@gmail.com.pg
Hanamoa Estates	Abau, Central Province	Michael Martin	+675 71691840	mike@hanamoa.org
Loloho Pure VCO (Elroi Trading)	Loloho, Autonomous Region of Bougainville	Natasha Mandanny	+675 79148047	natamandanny@gmail.com

Note – All survey results from producers and importers were gathered on the basis that details of their business would not be individually reported in any document that may be a matter of public record. Some of the companies listed above still either declined to be involved or only partially answered the survey questions due to commercial sensitivity.

2.0 Results of the PNG survey

2.1 PNG coconut production

2.1.1 History – production trends and volumes

The traditional coconut industry has comprised copra, copra oil and copra meal and as can be seen from Figures 1 and 2, the industry has been contracting since 1980. The decline of the industry can be attributed to five factors:

(1) The decline of the coconut plantation sector (largely expatriate owned) after the introduction of the Plantation Redistribution Scheme in 1974;

(2) The unsustainability of the Copra Price Stabilisation Scheme in the mid to late 1980s;

(3) Increasing awareness and price sensitivity of smallholder farmers from the 1980s onwards whose return on investment has declined since then;

(4) The emergence of substitute oils on the market together with some adverse publicity that copra oil received about its effect on human health and;

(5) The problems of the Copra Marketing Board (CMB) after PNG gained political independence in 1975.

We have shown the production of copra between 1980 and 2015 in Figure 1 below:

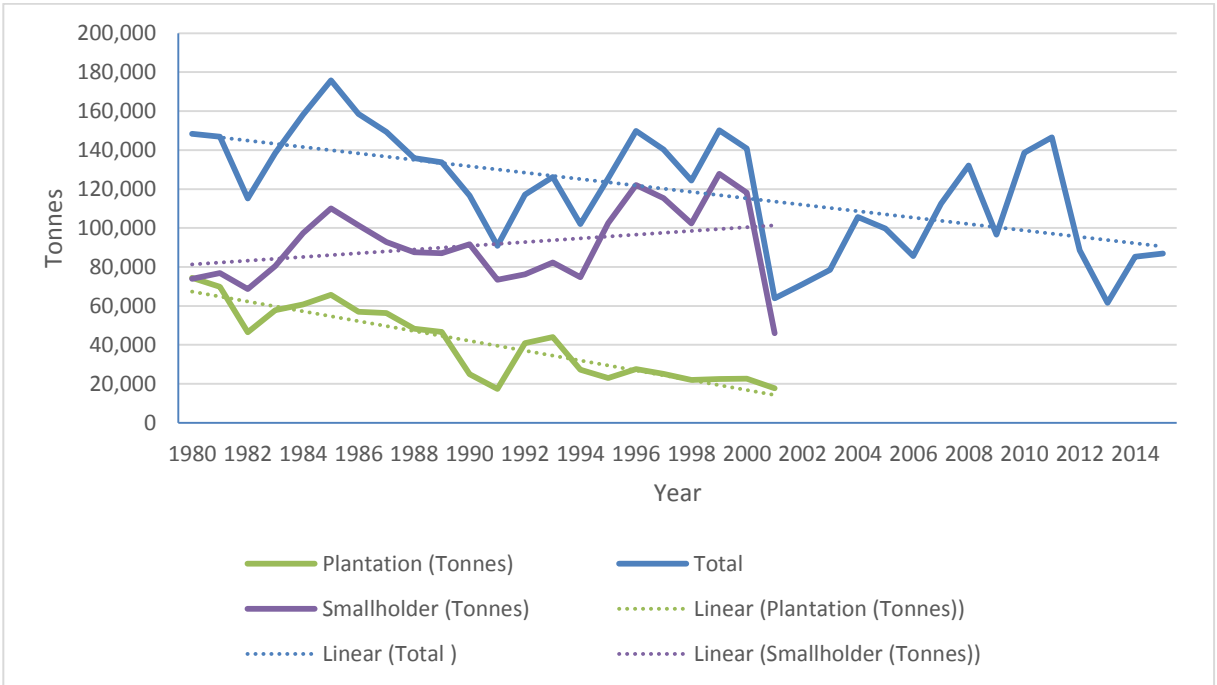

Figure 1 Copra Production in Papua New Guinea

The planation sector (which was largely expatriate owned) was the mainstay of the coconut industry up until 1974. Following the growing desire by local landowners to take over ownership of plantations, the House of Assembly passed the Plantation Redistribution Scheme in August 1974.

This contributed to the decline of the plantation sector as many of the plantations were taken over by Papua New Guineans who lacked the experience to manage and develop these businesses. In any case, production from the plantation sector fell steadily over the years. Smallholder production increased but not enough to compensate for the reduced production from the large plantation sector (refer to Figures 1 and 2).

The Copra Marketing Board (CMB) was established in 1948 and was not only the regulator but controlled the entire value chain from production and buying copra to marketing. The copra price

stabilisation scheme began in 1946 to protect farmers from price volatility and thereby smooth out income flows to plantation owners, smallholders and workers in the industry with the intention of ensuring the consistent production of copra.

The price of copra, copra oil and copra meal has always been determined on the world market and coconut-producing countries have been subjected to price volatility.

When copra prices were persistently low for a prolonged period from the mid to late 1980s, the predetermined threshold price for farmers could not be sustained and the copra stabilisation fund was exhausted.

Despite financial contributions from the government for a period of time to save the scheme, the scheme was eventually abandoned.

Figure 2 below shows the export volumes for copra, coconut oil and copra meal between 1980 - 2015.

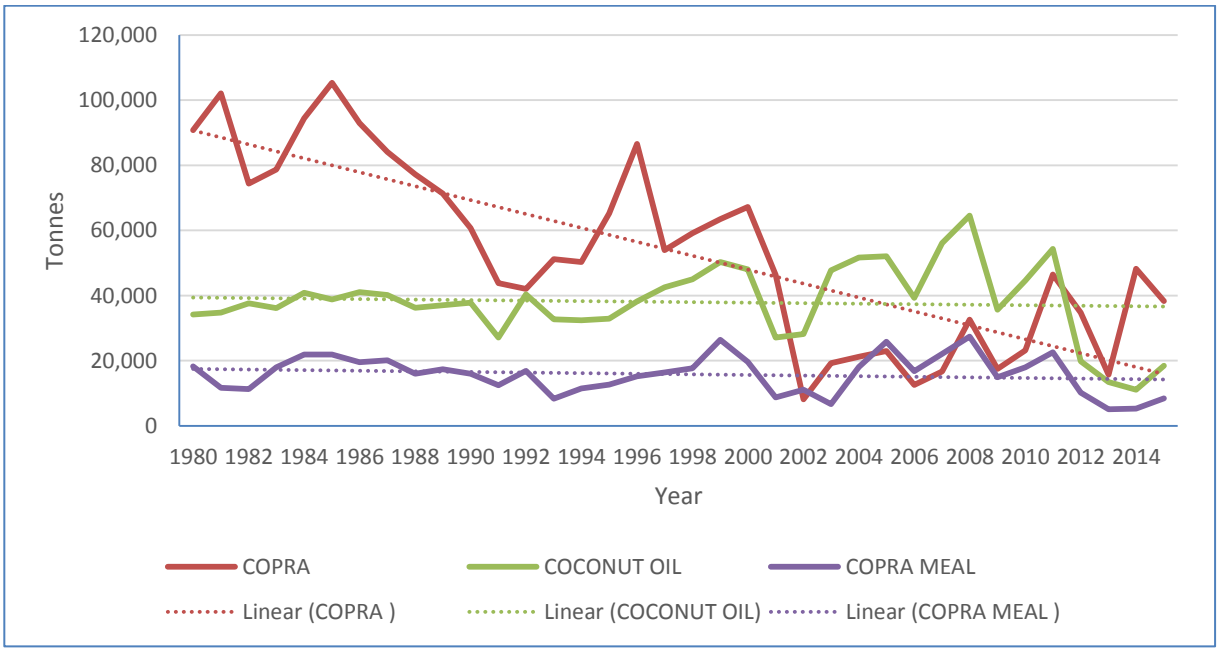

Figure 2: Coconut Product Export Volumes (tonnes)

By this time, farmers were increasingly aware of the risk to their income during the times when copra prices were low and in the absence of the stabilisation scheme, farmers were no longer able to or confident enough to produce coconut products in the same volumes.

In addition the availability of substitute oils, coupled with some adverse publicity that copra oil had received about its impact on human health, further damaged the coconut industry in PNG and elsewhere.

The CMB was the only permitted buyer and exporter of copra since the 1940s. It had buying depots in the coastal areas and the islands. There was only one oil mill at Toboi in Rabaul, East New Britain province, which was privately owned by Coconut Products Limited (CPL).

In 1993, CMB built another oil mill in Madang.

The CMB was not successful in managing the market during the 1980s and 1990s and both copra production and exports declined during the late 1990s and through to 2004 due to the failure of price stabilisation in PNG.

This failure resulted in the establishment of its successor, the Kokonas Indastri Koporesen (KIK) in 2002. KIK continued the CMBs role of buying and marketing copra apart from supplying its oil mill in Madang.

The number of buying depots had significantly reduced by the time KIK took over the role as the national coconut agent for the country. The number of buying depots had fallen from 22 depots in 11

provinces in 2001 to 10 depots in nine provinces in 2005 because CMB and then KIK could no longer service these depots due to declining production. The two oil mills became the main buyers of copra, as smallholders could not turn to other market options as KIK had monopoly over marketing.

In 2003, the government ended KIKs monopoly powers over marketing and KIK subsequently suffered losses and was forced to sell its oil mill in Madang to Coconut Oil Production Madang Ltd (COPM) in April 2004. The table below summarises production variation in recent years and shows a modest upturn in recent times.

Table 2: Production Trends and Volumes

	2011	2012	2013	2014	2015
Copra (tonnes)	146 526	88 555	61 536	85 281	86 873
Copra Crude Oil (tonnes)	54 349	19 847	13 466	11 068	18 467
Copra Meal (tonnes)	22 630	10 195	5 084	5 250	8 471
VCO (tonnes)	56	71	86	117	113
VCO meal (tonnes)	61	77	93	126	127
Body Oils (tonnes)	5	6	7	9	13
Soap (tonnes)	12	16	18	23	22
Desiccated coconut (1)	**Note** Markham Agro is the only producer of desiccated coconut in PNG. Their product is sold exclusively in PNG, and they have not provided data on this product.				

The production of Virgin Coconut Oil (VCO) and related products (such as soap, body oils, desiccated coconut, stock feed, bio fuel etc.) has emerged as a viable alternative to copra production in some areas. The first known producer of VCO began producing for the local market in ENB province in the early 1990s. To date there are 14 small to medium size enterprises (SMEs) producing VCO and related products in Port Moresby, Central Province, East Sepik, Madang, New Ireland, East New Britain and North Solomons Province.

VCO production has more than doubled since 2011 from about 56 tonnes to 113 tonnes in 2015 (see Table 2 above). The same trend can be observed for other related coconut oil products. There are currently three medium size producers (processing more than 1 000 coconuts a day). The biggest of the three has been exporting VCO products since 2008.

This firm is already well established in the domestic market (packaged products) and the export markets such as Australia, New Zealand and the UK (packaged products).

The second largest company started producing in 2011 has been exporting unpackaged bulk VCO since then.

The third producer started producing in 2015 and exporting packaged products in the same year. The rest of the producers operate on a small scale (generally much less than 1 000 nuts a day) and mainly service domestic demand. A few sell their packaged products via family and personal networks in Australia.

The VCO industry is the new emerging growth opportunity throughout coconut producing countries. Domestic and international demand is driven by cosmetic and health related products. The rise in lifestyle diseases such as diabetes is fuelling demand in developed countries such as the US, Australia and New Zealand where health products using coconut are becoming more common.

Internationally the quantities of VCO supplied are lower than other coconut products such as copra, copra crude oil and copra meal, but the per unit value is much higher.

As three PNG organisations dominate the local production and export of VCO, they have been understandably reluctant to share market information for competitive reasons.

In PNG, supply has been restricted by the reducing productivity of ageing trees, barriers to market access such as shipping costs, certification costs, food safety requirements, packaging and labelling requirements.

With growing international demand for VCO (see Section 4 for market discussions), it is reasonable to expect that these products will continue to attract premium prices. However there are an increasing number of VCO products from other countries in the Pacific and Asia, which are finding their way to retail outlets in developed countries.

We also note that like most product markets, the internet is a relevant marketplace for coconut product exports – refer to the link where buyers in most Pacific countries are seeking bulk coconut oil: *http://www.go4worldbusiness.com/find?regionFilter%5B%5D=Oceania+&searchText=coconut+oil*

2.1.2 Current and future production capacity

Table 3 below shows the full production capacity of the SMEs. The oil extraction and processing technology varied across all SMEs visited. The range of technology elements included the following: the Centrifugal Separator, the Fermentation Plant set up, the DME, the Ram press, the Screw press and the oil squeezer.

- The DME set up can produce approximately 10 MT of VCO per annum at full capacity.
- The Centrifugal Separator plant set up on the other hand, can produce up to 300 MT of VCO annually at full capacity utilisation, 30 times more than the DME set up.
- Most of the SMEs surveyed were producing well below their production capacity and were only producing to meet the current demands / orders that they have secured, including international demand.

Table 3: Current and Estimated Achievable Production Capacity

	Current Production (MT)	Estimated Capacity (MT)	Spare Capacity (%)
Copra	20 673	31 515	34%
Copra Crude Oil (MT)	Not stated	Not stated	
Copra Meal (MT)	1 349	9 902	86%
Virgin coconut oil (MT)	113	836	86%
VCO meal (MT)	127	510	76%
Body Oils (MT)	13	278	95%
Soap (MT)	22	67	67%

Note: Estimated capacity is based upon responses made by SMEs in the survey. Gravelroad has not assessed how realistic their responses may be. Note that unused production capacity is from 34% to 95% of current capacity. This means that if market access is available, existing production capacity supports significant growth potential.

VCO alone has the potential to achieve between K11 to K15 million ($US 10.7 to 14.8 million) export earnings if it were all exported in bulk.

2.2 PNG domestic retail sales

2.2.1 Domestic sales volumes – imported plus domestically produced

PNG domestic demand for high-value coconut products has steadily increased between 2011 and 2014 as consumers become aware of the health and cosmetic benefits of coconut products. However, consumption has remained relatively the same between 2014 and 2015 for VCO, VCO soap and VCO meal. Table 4 shows estimates of the total volume of retail sales in PNG and we note the significant growth of body oil consumption in the last two years.

Table 4: Total Domestic Retail Sales Volumes (Domestic Demand)

	2011	2012	2013	2014	2015	Last 12 Months Growth
Virgin coconut oil (VCO) (MT)*	11	14	17	32	31	-3%
Body Oils (MT)**	0.5	0.7	0.8	1.8	4.98	177%
Soap (MT)**	9	11	13	15	15	0%
Stock feed (VCO meal) (MT)***	61	77	93	126	127	<1%

*computed as Domestic retail sales (or Domestic Demand) = Domestic production (Table 2) – Exports (Table 9) + Imports (Table 7).

**computed as Domestic retail sales (or Domestic Demand) = Domestic production (Table 2) – Exports (Table 9). Import data from Customs did not show any data for these products.

***Represents domestic production. VCO meal is not exported and is not imported.

Source: SME survey and Customs data

2.2.2 Domestic sales volumes of local product

Table 5 shows the proportion of the domestic retail consumption that is manufactured in PNG, showing that PNG producers are supplying almost the entire PNG domestic market. This is consistent with our survey of a sample of retail shops in the areas that we visited. Import data obtained from Customs PNG show that the main imported coconut products were desiccated coconut, coconut milk powder, coconut cream milk, coconut milk and coconut cream. VCO imports were negligible.

Two of the three big SMEs sell between 10-20% of their products in the domestic market through retail shops such as supermarkets and chemists. Remaining retail sales are attributed to the smaller SMEs. Some have their products sold through small retail outlets, purchased by livestock farmers, local hotels and restaurants while some of the sales have been directly to end users through family and personal networks.

Coconut soap and body oil products from one of the big SMEs are available at City Pharmacy and Stop N Shop supermarket throughout the country. Coconut hair oil from another of the big SMEs is available in most retail shops and pharmacies throughout the country. None of their VCO products are available in the country. VCO and soap products in the domestic retail market are attributed to the smaller SMEs.

Table 5: % of domestic retail sales volumes supplied by PNG produced product

	2011	2012	2013	2014	2015
Virgin coconut oil (VCO) (MT)	100%	100%	99.89%	99.98%	99.96%
Body Oils (MT)	100%	100%	100%	100%	100%
Soap (MT)	100%	100%	100%	100%	100%

Papua New Guineans are interested in purchasing locally made products. Several SMEs we spoke to said that they had seen increased demand for their products following recent documentary TV coverage of PNG producers of VCO.

2.2.3 Domestic sales volumes of imported products

Table 6: Imported Products

Product	2011	2012	2013	2014	2015
Virgin coconut oil (VCO) (KG)			18.1	5.26	10.82

Desiccated coconut (KG)	8,290	29,183	23,717	46,183	44,724
Coconut milk powder (KG)	6,818	6,950	4,055	1,750	8,179
Coconut cream, milk (KG)	5,704	4,429	4,488	1,750	8,179
Coconut Milk (KG)	922	2,525	1,222	1,862	3,566
Coconut cream (KG)	4,218	4,756	2,255	3,365	3,380
Coconut oil (KG)	160	59.15	92	42.77	425
Coconut spread (KG)	48	88		3	417
Coconut water (KG)			6		379
Coconut water (KG)					874
Coconut prepared (KG)		2	1	24	334
Coconut dry (KG)	213	16	173	22	332
Coconut gel (KG)		2,154	41	164	328
Coconut powder (KG)	27	720	92	70	248
Coconut cooking oil (KG)	2		65		188
Coconut sugar (KG)					56
Coconut cream powder (KG)		65	50	105	55
Coconut oil organic (KG)				1	45
Coconut Flour (KG)			28		6
Other coconut (KG)	691	374	166	431	634

Source: Customs PNG (Customs classification). Note that some VCO may be classified as coconut cooking oil.

VCO imports originated from the Philippines (2013, 2014 and 2015), Fiji (2013) and Australia (2015). The imported volumes were insignificant compared to domestic production. Most other processed coconut products showed strong growth. Three products are worth noting, coconut water, coconut sugar and coconut flour, which have recently entered the PNG market. Coconut water and coconut sugar are been imported from Australia and Thailand respectively. Coconut flour is imported from Australia and the US. We believe the international market for VCO is strong and presents an opportunity for local producers to progress to exports from their current supply of the domestic market. In the case of the other processed coconut products listed above, local production of competitive products is unlikely in the short term due to the relatively heavy capital investment on processing plant.

Both Malaysia and Australia are the biggest suppliers to the PNG market accounting for 49% and 46% of the total imports respectively. The other suppliers are Canada, China, Hong Kong, Fiji, Indonesia, Japan, New Zealand, Philippines, Singapore, Thailand and the US. In Section 3 we present an economic model for SME VCO production.

2.2.4 Domestic prices

Domestic retail and wholesale prices vary widely depending upon geographic location and perceived product quality.

Table 7: Domestic prices

	Retail (end user) Price Range in Kina	**Wholesale Prices (Kina)**

Virgin coconut oil (VCO) 1L	10 to 30	5 to 25
VCO 500ml	5 to 20	3 to 12.50
VCO 400ml	35 to 40	30 to 35
VCO 100ml	5	2.50
Body Oils 250 ml	12	8 to 8.60
Body Oils 100ml	30 to 35	25 to 30
Soap (100g)	1 to 12	0.5 to 8
Soap (small hotel size)	1	0.50
VCO stock feed / meal (50kg) purchased by end user	30.00	25.50
VCO stock feed / meal (1kg) purchased by end user	2.00	1

This variation in price is due to the fact that SMEs are generally selling to customers in their own areas and prices charged are unique to their localities. They also sell to out of town customers who are willing to pay for the freight as well. Competition amongst one or two SMEs in their localities is not that intense as yet. There are two SMEs located in East Sepik province, two in New Ireland Province, three in East New Britain Province, one in Madang, one in North Solomon's Province, two in Central Province and two in Port Moresby. The types of customers that the smaller SMEs cater for include:

- Local direct sales to personal network of contacts (some are high income earners);
- Out of town PNG nationals (most of whom are middle to high income earners);
- Local expatriates;
- Out of town expatriates (including tourists);
- Local hotels, local restaurants;
- Local retail shops; and
- Visiting cruise ships.

One SME in the East New Britain Province ended up agreeing to different prices with different retail shops due to their bargaining power. They argued that the product was new and that they were not sure whether or not it will sell well. We also observed in the same province, the price of a coconut hair oil produced by another SME varied considerably from one retail shop to the other, ranging from K4.50 to K9 per 100ml bottle. Similar occurrences were also observed in other parts of the country.

Prices charged to the expatriate community, in the informal network market, were slightly higher than to the PNG nationals.

In the case of one SME, the VCO meal was packed in 50 kg bags and sold to local livestock farmers for K25.50 per bag as stock feed. In other cases, the meal was sold directly to local livestock farmers ranging from 50t to K1 per kg, and to mothers who use the meal as topping for donuts, which they sell at the local markets and street side stalls.

It was also observed during the field visits that some of the SMEs had stopped producing to manage inventory build-up. They generally produce enough to meet current domestic demand and while they find more buyers through their current customers and network.

2.2.5 Market description

Packaging in PNG is relatively unsophisticated when compared to international markets. The quality of packaging for imported products was generally higher than for locally produced goods. For some local brands there was evidence that bottles leaked.

Some imported products were not designed for the PNG market, as they had wide tops designed for the customer to extract the contents using a spoon rather than pouring it out. This is because in most overseas markets the product will be a solid at room temperature in the customer's premises, although in PNG for most customers the product will be a liquid at room temperature in their home. Most locally produced product was in plastic containers. In overseas markets most coconut oils are sold in glass containers. Labelling of locally produced product was also of poorer quality than in overseas markets.

Most PNG product in supermarkets was marketed as body oil rather than as a food grade cooking oil.

Key messages on packaging in PNG are:

- Organic – Raw and Wild harvested
- Regrowth – Regeneration
- Single Origin
- Researched by CCIPNG
- Hydrates and pampers skin
- Able to withstand high temperatures without heat damage
- Ideal for stir fries, frying and baking
- No cholesterol
- No Trans fatty acids

There were some instances of local products making what may be unsubstantiated claims. This included:

- Labelling product as being Virgin Coconut Oil when it may be only refined coconut oil rather than VCO.
- Claims of hair regeneration
- Claims of providing protection against cancer
- References to HIV virus

2.3 Export Sales from PNG

2.3.1 Volumes

For reasons discussed earlier, export volumes for copra, copra oil and copra meal have been declining since 1980. Export volumes for VCO and related products have been increasing since 2011, but remain proportionally small compared to the copra products. Volumes are projected to increase as the smaller SMEs mature in the domestic market and plan to move into the export market.

Table 8: Export Volumes[4]

	2011	2012	2013	2014	2015	Significant Growth
Copra (MT)	46 500	34 725	15 673	48 228	38 311	No
Copra Crude Oil (MT)	54 349	19 847	13 466	11 068	18 467	Yes
Copra Meal (MT)	22 630	10 195	5 084	5 250	8 471	Yes
Virgin coconut oil (MT)	45.21	57.02	69.03	84.94	82.49	No
Body Oils (MT)	4.5	5.3	6.2	7.2	8.02	No
Soap (MT)	3.28	4.68	4.76	7.56	6.97	No

[4] Estimates from SME survey

Desiccated coconut (MT)				0.02		NA

2.3.2 Export prices (PNG products)

VCO as a bulk product from PNG is currently fetching a higher premium price (ranging from US$5,500 (fob) to US$8,000 (fob) per metric tonne) than copra oil (US$795 (fob) per metric tonne). However, our research in NZ and Australia indicates that there is likely to be downwards pressure on these prices.

Two of the SMEs who export VCO products would not release their export prices due to commercial sensitivity. This was also true of importers in Australia and New Zealand. Further work is necessary beyond the scope of this project to gather this important information. Because of commercial sensitivity it is likely that each SME may need to make their own direct enquiries from potential buyers at the time they seek to enter new markets.

The retail prices reported in Table 10 below are the prices of Niugini Organics products observed on the shelves of shops (supermarkets, health food shops etc.) in Australia and New Zealand, online shops and from responses of two SMEs whose products are sold in Australia by family members and friends who live in Australia. They illustrate how much prices can vary from one market to another and from one retail outlet to another. For example;

The same PNG produced one litre bottled of VCO product retails in Australia for about $25 to $28 and in New Zealand for $40.

The same 100-gram VOC soap retails in Australia for between $3 to $12 and in New Zealand $5.50.

A 100 ml VCO body oil retails in Australia for $8 and a 100 ml VCO hair oil retails in New Zealand for $8.50.

Table 9: Export Prices VCO and Retail VCO Prices New Zealand and Australia

Product	Australia	New Zealand
VCO (5L)		NZ$115
VCO (1L)	AU$24.95 to $27.95	NZ$40 Seen at $5.50/500lm
VCO (650ml)	AU$18.95	NZ$19.95 to NZ$25
VCO (500ml)	AU$15	
VCO (375ml)	AU$15	
VCO (350ml)	AU$10.95 to $18.95	
VCO (320ml)	AU$9 to $10.95	NZ$13.50
VCO (250ml)	AU$12	
Body Oils (100ml)	AU$8	
Body/Hair oil (100ml)		NZ$8.50
Coconut Soap pure (100g)	AU$3 to $12.36	NZ$5.50
Coconut Soap scented (100g)	AU$3 to $11.40	NZ$5.50

Table 10 FOB Prices/retail

Product	2011	2012	2013	2014	2015
Copra (MT, PGK FOB)	1 663	987	494	1542	1528
Copra Crude Oil (MT, PGK FOB)	3 184	1 510	1 341	2 430	2 520

Copra Meal (MT, PGK FOB)	305	248	281	533	611

Table 10 shows approximate FOB prices for copra, copra crude oil and Copra Meal. The prices for these commodities fluctuate over time depending upon international demand. Comparable prices for VOC (VCO) are considerably higher at around PGK12 000 to 17 000 per MT FOB.

2.3.3 Coastal and international shipping

Coastal shipping in PNG is largely provided by Consort Express Lines (CEL), who merged with Steamships shipping on July 1st 2016 allowing CEL to take over the coastal shipping services along the Papuan coast. Both companies are owned by Swire shipping. Bismark Maritime (BM) is the only other significant operator competing with CEL for coastal cargo.

Under the Cabotage rules in PNG, only PNG flagged and registered shipping companies (such as CEL and BM) are permitted to carry coastal cargo and passengers. During a review of the coastal shipping industry five years ago, the ICCC recommended a relaxation of this policy as it was anti-competitive.

This has resulted in permits being granted by the Transport Department to international shipping companies sailing to PNG ports and which can carry coastal cargo. This includes Carpenters Shipping, Swire Shipping, ANL and Sofrana Unilines.

While we note that there is greater competition in coastal shipping in PNG, the many islands, distributed growing locations and distances to processing and distribution/export points inevitably lead to higher overall production costs for coconut products in PNG.

There are six international shipping companies that sail to and from PNG, namely Sofrana Unilines, ANL, Swire Shipping, Carpenters Shipping, Kyowa Shipping and New Pacific Line. CEL, a PNG registered company and owned by Swire Shipping, provides shipping services to Townsville in Australia. International shipping services from PNG can be grouped into three types of services:

(1) The PNG / Australia / New Zealand service,

(2) The PNG / Australia via Asia service, and

(3) The PNG / Asia service.

The PNG / Australia / New Zealand service

Sofrana and Swire shipping provides service from ports in PNG to New Zealand. ANL, CEL, Swire, and Kyowa shipping run services from ports in PNG to Australia.

PNG / Australia service via Asia

ANL runs a regular service from Madang, Lae, Rabaul and Port Moresby to Sydney and Melbourne via Malaysia.

PNG / Asia service

Carpenters connects PNG with the rest of Asia via Singapore once a month. Swire shipping runs regular services to ports in Asia with 9 different vessels. Kyowa shipping connects PNG with the rest of Asia via Busan and New Pacific Line does the same but via Nansha and Ningbo. Exports of VCO and VCO products attributed to two of the three big SMEs are currently taking place out of Rabaul to markets in Japan, New Zealand, Australia and the UK. The only other exporter out of Port Moresby is exporting to Australia. Wewak, Kavieng and Loloho are not serviced by international shipping and SMEs in these areas will have to rely on coastal shippers (Consort and Bismark) to transhipp their VCO products at the nearest port that is serviced by international shipping.

Gravelroad was able to obtain a quote from CEL to ship a 20-foot container with a gross weight of 24 metric tonnes (about 22 MT of VCO in the container) from Kavieng to Townsville (Australia). The container was to be transhipped at Lae port and consigned as international cargo. The shipping cost was quoted at K6 003 (US$1 894). All the shipping companies carry break-bulk cargo while some do not. Generally break bulk will be more expensive on a per kg basis, so sending a full container will be more economical for exports.

An SME based in ENB province expressed caution against the shipping quote from CEL as CEL does not service any other international destinations. The SME claims that it would be cheaper to ship a full 20' container from Rabaul to Brisbane than from Rabaul to Townsville. It claims further that Kyowa Line is in fact cheaper for shipping break bulk to Townsville from Lae or Rabaul. The SME further argues that Townsville may not be the best example of an export destination. Onward freight from Townsville to other destinations in Australia has to be done by road and or rail and can cost the same again to get a shipment to Brisbane. For example, 3 MT of VCO from Rabaul to Brisbane via Townsville would be approximately US$ 850. The same cargo from Rabaul to Townsville would be about US$1 000 and then from Townsville to Brisbane by land would be about US$850. The total cost in the end would be $US1 850.

This SME claims that shipping for many years has greatly impacted on their competitive edge, which in turn has hindered the company's growth and expansion. It claims that this will be a bigger issue for new producers as the accelerated growth of VCO production across the region and world is increasing competition in the market place hence costs such as freight and organic certification will play an even more important role. However, our initial view, presented in the following paragraphs, is that while shipping costs around and out of PNG are relatively high, they do not appear to be a significant barrier to export costs.

Further shipping cost information was provided by this SME. According to this SME only a handful of shipping companies will accept Break Bulk and only a minimum volume of 5 cubic meters. Any volumes less than 5 cubic meters will be charged for 5. Total freight costs from Rabaul to Auckland for 1 MT of VCO can be as high as US$1 600 – 1 800, depending on exchange rate (inclusive of local charges).

The local charges include:

Transport / Delivery to wharf	K 250.00 per MT
Export entry	K 400.00 per entry
NAQIA inspections	K 400.00 per shipment
Fumigation	K 375.00 depending on importing countries requirements re pallets
Courier of original documents to client	K 120.00
TOTAL	K 1 545.00 (US$ 1 800)
Freight costs	US$1 800
Total Export costs	**US$ 2 300.00**

Total export costs were as high as US$2 300 and represented potentially close to 50% of the FOB value of the product. This SME therefore argues that for those SMEs shipping small volumes, shipping IS a barrier to exporting products from PNG, not just by way of cost but logistically as well, when trying to reach key high end value market destinations around the world. However, this SME reported in the survey that the international shipping cost was paid by the buyer (FOB pricing basis) and it only incurred local charges of US$500, which only represented just over 9% of the value of the product. Clearly in this case then shipping costs are not necessarily a barrier to exporting from PNG, even for smaller volumes.

This SME also provided the following information for the breakup of cost of shipping a FCL 20' container from Rabaul to Auckland:

FREIGHT	US$2 054.00	
BAF @ 14.5 %	US$297.83	
Security	US$60.00	
Doc Fee	US$ 30.00	
Sub-Total	**US$2 441.83**	**K7 560.00**
PNG Locals	K2 645.50	
Cartage to wharf	K1 000.00	
Export entry	K400.00	
NAQIA fees	K400.00	

Fumigation (if required by importing country)	K375.00	
Original docs to client (TNT/DHL)	K120.00	
Sub-Total	**US$1 595.80**	**K4 940.50**
Total Shipping / Export Cost	**US$4 037.63**	**K12 500.50**

According to the SME, a 20' container can be packed with 15.2 MT or 20 MT of VCO (depending on the type of packaging) and the SME puts freight costs at US$269.17 and US$201.90 per MT respectively. Total export cost would be US$4 037.63 but if the buyer is paying the international shipping costs with pricing on an FOB basis as in this case, then the export costs to the SME is US$1 595.80, which represents just over 7% of the value of the product[5]. Again we conclude that shipping cost is not necessarily a barrier to exporting high-value coconut products from PNG.

This is consistent with our analysis above and below that the higher the volume the cheaper the freight costs. This means that shipping higher volumes will be much more cost efficient and current production capacity should allow this. Currently there is a great deal of excess production capacity in the industry, including the SME from whom this shipping information has been obtained.

Shipping is mainly done through shipping agents. The SME was able to provide shipping costs for three shipping agents for shipment from Rabaul to Auckland.

Table 11: Export / Freight Rate Comparison for Shipment of 1 x 20' GP to Same Destination[6]

Shipping Agent	Shipping Line		Freight 20' GP	BAF		+	Total Freight	PNG Local Cost	Delivery to Wharf	Total Export Admin Costs	Sub-Total	Equivalent Total in	Equivalent Total in
			USD	USD		USD	USD	PGK	PGK	PGK	PGK	PGK	USD
Steamships Shipping Agency	SWIRES		2,200.00	-	550.00	12	2,762.00	1,968.40	1,000.00	1,295.00	4,263.40	8,631.25	4,139.08
Express Freight Management (EFM) / Customs & Management Service	SOFRANA		2,350.00	14.50%	340.75	60	2,750.75	2,645.50	1,000.00	1,295.00	4,940.50	8,516.25	4,346.53
Carpenters Shipping Agency PNG	KYOWA LINE	*	2,450.00	-	-	-	2,450.00	2,242.90	1,000.00	1,295.00	4,537.90	7,585.14	3,915.74
		*BAF is included in the amount of 2,450.00											

As can be seen from Table 11 above that shipping costs are fairly evenly priced across the board. Swire does not accept break bulk but Sofrana does, however Sofrana is only good for shipping to New Zealand. Kyowa Line, Swires and ANL ship to other market destinations that this SME exports to. According to this SME, the choice of shipping line depends on the schedule and logistics. This SME is sometimes forced to use a local coastal shipping company to get cargo to Lae in time to meet an international vessel and says that timing and transhipment / agency costs can hurt doing this also.

All shipping goes through Lae and shipping companies like Sofrana and the Kyowa Line will only call into Rabaul port if there is sufficient cargo to deliver or collect which makes the schedule a little unreliable. This SME recommends that SMEs need to target markets that have workable and competitive shipping rates. Not all markets are reachable when dealing with small volumes out of PNG.

Gravelroad is aware that there are also other charges for the client at the port of discharge, including transhipment costs (both sea and land based), which the SME has rightly pointed out. However, the exporter has to consider an export price that will cover at least its operational costs and shipping costs, and one that is mutually beneficial to the SME and the buyer.

[5] Value of product = Export price US$1,100 per MT x 20 MT. Assuming the 20' container is filled with 20 MT of VCO. The export price is based on the SMEs response in the survey questionnaire.
[6] Information sourced from SME survey

The two SMEs that are currently exporting VCO, reported that the buyer paid for the international shipping costs. The two SMEs only incurred local shipping charges. Both SMEs exported volumes that were 5 MT or less in 2015. All the SMEs reported that their buyers picked up the domestic freight charges (both air and sea).

From the discussion above, Gravelroad concludes that shipping is not significant barrier to exporting high-value coconut products from PNG.

We have illustrated this in Table 12 and Table 13. We have assumed that VCO is shipped from PNG to Auckland NZ in bulk, where it is then packaged before being distributed to supermarkets. We have assumed that the shipping cost for 1 MT is the same as the shipping cost for 5 MT. Table 12 show the effect of shipping smaller quantities by break bulk versus sending a full container load. Sending a single MT results in a landed cost for VCO, which is more than 30% higher than a full container. However sending 5 MT as break-bulk results in landed price that is only 3% higher.

Table 12: Impact of small volumes on Landed VCO Cost.

Export Quantity	1 MT	5 MT	20 MT
	US$ per Tonne		
FOB VCO Price	5 500	5 500	5 500
Product Value (VCO)	5 500	27 500	110 000
Shipping Cost (To Auckland NZ)	1 800	1 800	4 400
Transport from wharf to processing plant in NZ	300	300	300
Landed VCO Cost	7 600	5 920	5 735

Table 13 shows the impact of the landed cost on a wholesaler's margin. To compete in the market, the wholesaler must deliver product to the supermarket for $8.21. The higher their landed cost, the lower their margin, and the more efficient they need to be with their processing. The lower cost available from buying a full container results in a margin that is only 3% higher than a 5 MT shipment, but 23% higher than a 1 MT shipment.

Table 13: Wholesalers Margins

Export Quantity	1 MT	5 MT	20 MT
	US$ per 500 ml Glass Jar		
Landed Cost per 500 ml	3.80	2.96	2.87
Processing & wholesalers margin	3.18	4.02	4.11
Packaging (Jar, lid and label)	1.01	1.01	1.01
NZ Domestic Freight (Delivery to Supermarket)	0.22	0.22	0.22
Wholesale Price delivered to Super market	8.21	8.21	8.21
Super market margin	2.74	2.74	2.74
Retail Price in US$	10.95	10.95	10.95
Retail Price in NZ$	15.00	15.00	15.00

Note: These prices are estimated based upon market observations made during this survey.

From this analysis we conclude that wholesalers will want to import more than a single MT at a time, but may not insist on importing a full container load. Their requirement for a full container load will depend upon how much product they can sell.

We also observed that in the NZ market about half the imported VCO was from Sri Lanka. Sri Lanka appears to be gaining market share, with some importers having recently switched to importing Sri Lankan product. Shipping costs from Sri Lanka to NZ are either the same or at worst 10% lower than

shipping costs from PNG to NZ. As the shipping costs represents only 2% of the retail price, we do not think that a 10% difference in shipping cost is likely to create a barrier.

Overall we concluded that shipping was not generally a barrier to exporting product. While PNG conditions may create some frustrations for exporters, shipping is generally both available and represents a small portion (only 2%) of the value of the VCO retail products.

However, shipping quantities of less than 5MT is likely to be uncompetitive, and as VCO matures as a product in the foreign markets cost competition will become more important. While it is not currently the case, we expect that eventually it will be necessary to ship full container loads in order to be competitive.

3.0 Product viability

There is currently no mandatory quality testing of coconut products in PNG. Most SMEs visited are not doing quality testing and are not required to undertake quality testing. KIK, PHAMA and the SMEs are in discussions and there is general consensus to adopt the APCC (Asia Pacific Coconut Community) quality standards and APCC packaging and labelling standards.

Stakeholders were advised during the last SME stakeholder's workshop of the existence and requirements of PNG's Packaging and Labelling Act that the ICCC administers.

It was noted that the type of processing technology employed posed capacity constraints, lack of accessibility to good labelling equipment, packaging material, and the costs associated with packaging and labelling.

The SMEs surveyed wanted to know how they can obtain certification, which organizations to approach, how long it will take to get certified, whether or not it is renewed annually and the cost of certification. Some SMEs suggested that PNG should have its own independent certification authority who can be recognized by APCC, other certification authorities and other international authorities. This may be a role for KIK to consider.

A critical issue noted was that certification was only concerned about the source of the coconut (where the coconuts are grown, farming methods and whether or not farmers are paid a fair return). What is missing is that the production process is not audited. KIK is addressing this issue by requiring HACCP certification of the production process of the SMEs. This is to ensure that the oil that is produced is real virgin coconut oil and also complies with the APCC standards.

Only two producers have attained organic and fair trade certification.

These matters of quality and technical compliance are widely reported as critical with Australian and New Zealand importers, and the countries they are importing from now already meet these requirements.

3.1 Organic certification

Listed below are the organic certification bodies in the markets of interest in this study.

Australia: Australian Certified Organic (ACO), Bio-Dynamic Research Institute (BDRI), The National Association for Sustainable Agriculture Australia Ltd (NASAA), Organic Food Chain (OFC), Organic Growers Of Australia (OGA), Safe Food Queensland (SFQ), and Tasmanian Organic Association (T.O.P).

New Zealand: Assure Quality, BioGro New Zealand Ltd, Organic Farm NZ (OFNZ).

Europe: Ecocert

USA: United States Department of Agriculture (USDA)

Japan: Japanese Agricultural Standards (JAS)

China: Organic Food Development and Certification Center of China (IOAS also known as OFDC)

The main certification bodies for operations outside Australia are ACO and NASAA. Organic certification granted by both bodies are recognised by New Zealand, Europe, USA and Japan and exports into these markets are allowed.

The main certification bodies for operations outside New Zealand are Assure Quality and BioGro New Zealand Ltd. Organic certification granted by both bodies permits global market access into Australia, Europe, USA and Japan.

OFDC (China) recognises European and Canadian organic standards, and those organic certification bodies accredited with IFOAM (the International Federation of Organic Agricultural Movements). All certification bodies mentioned above are accredited with IFOAM.

Organic certification procedures and processes vary across all certification bodies but are very similar in many respects. The process can be summarised as follows in Figure 3 below. The process described below is much simplified.

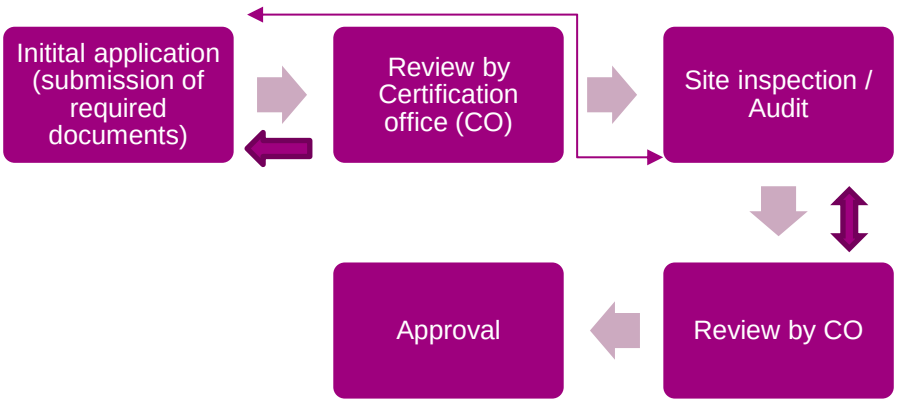

Figure 3 – Organic Certification Process

The initial application requires the submission of required documents to the Certification office (CO) within ACO or NASAA (refer to Appendix C and Appendix D for the actual certification process for ACO and NASAA and the website address for the required documents). The CO then reviews this to make sure that they are complete and the responses comply with the requirements set by ACO or NASAA. The CO will consult with the applicant if the documents are not in order.

The CO, once satisfied with the documents, will approve them. This will trigger the next stage which is the site inspection. The inspectors will normally consult with the applicant during the inspection period. The inspection report is then submitted to the CO. The CO will consult with the inspectors if it has further questions and if need be the inspectors will consult with the applicant. Once approved by the CO, organic certification is then granted. For ACO and BioGro, the entire process can take up to a minimum of three months and for NASAA, a minimum of one year. The critical part of the process is the initial application. That is that the applicant must ensure that the required documents are completed and correct in the first instance. Annual audits are done to maintain certification.

It was clear during the field visits that most SMEs were not aware of the certification costs and assumed that the costs were beyond their reach.

Gravelroad was able to obtain cost data from ACO and NASAA, which are described below in Table 14 and 15.

Table 14: ACO Certification costs, in Australian dollars, for growers and processor:

Cost	$AU	Payment Type	Description
Application fee	$520	One off	One off
Audit fee	$1 175	Per day (minimum two day)	Annual & ongoing costs
Travel (accommodation and meals)	$505	Per day (minimum three days)	Annual & ongoing costs
Overhead costs: travel (air) and travel within country charged to client			
Review, licensing & certification administration	$500	Fixed	Annual & ongoing costs
Product and Label assessment			
Product assessment (single ingredient)	$10	Per product	Annual & ongoing costs
Label approval (single ingredient)	$10	Per label	Annual & ongoing costs

Total (exclusive of overhead costs)	$4 905	Initial cost	$4 385 (exclusive of overhead costs) annual & ongoing costs

The estimated certification cost of $4 905 (exclusive of overhead costs) is based on a minimum of two days of site audit and inspection and three days of travel and accommodation. Annual costs are about $4 385 (exclusive of overhead costs). The number of days required for site travel, audit and inspection depends on the number of farmers and how far they are from the processor. Products with more than one ingredient will be charged $20 per product and hence labels with more than one ingredient, $30 per label. The certification costs could increase if soil and tissue testing is required. Costs could increase further if corrective action is required. To avoid this cost applicants are required to show three to five years of documentary evidence that the farms where the coconuts are sourced were free from the use of fertilizers and other chemical inputs.

Approval of the initial application can take somewhere from six to eight weeks. If the certification office is satisfied that the coconut farms are organic, then the applicant is deemed In- Conversion. From this point to when the certification is granted will take a minimum of 12 months. So the total waiting time will be about 14 months. The applicant can request for the application to be fast tracked and this will attract an additional fee of $535 and the waiting period can be halved to seven months.

Table 15: NASAA Certification costs, in Australian dollars, for growers and processor:

Cost	$AU	Payment Type	Description
Initial Application fee: Grower group	$535	One off	One off
Initial Application fee: Processor	$535	One off	One off
Initial Inspection fee	$990	Per day (minimum 2 days)	Initial
Report writing	$530	Grower group	Initial
Report writing	$530	Processor	Initial
Travel (accommodation & meals)	$530	Per day (minimum 3 days)	Annual & ongoing
Overhead costs for air travel and travel within country charged to client	Variable	Variable	Annual & ongoing
Re-inspection fee	$800	Grower group	Annual & ongoing
Re-inspection fee	$800	Processor	Annual & ongoing
Total costs (exclusive of overhead costs)	$5 700	Initial costs	$3 190 plus overhead costs, annual and ongoing costs

The total initial cost of $5 700 (exclusive of overhead costs) is based on two days of inspection and three days of travel. Annual costs are in the order of $3 190 (exclusive of overhead costs).

NASAA will normally ask the following questions:

- Are the coconuts sourced from a single farm or from a group of growers?
- If sourced from a group of growers, how many are there?
- What is the size and location of each farm?
- Where does the processing of the coconuts take place?
- Is the processing facility located on or off farm?
- What International markets are you intending to market to?

The answers to these questions will determine the total initial costs and the annual costs. The waiting period from the date of submitting the application to certification approval is about three months.

BioGro New Zealand has advised that applicants from PNG are better advised to seek organic certification from ACO or NASAA to save costs, as PNG is closer to Australia. New Zealand recognises certification granted by ACO and NASAA. It is recommended that SMEs establish contact with ACO and NASAA and endeavour to understand the process and the costs involved and then make an informed decision.

3.2 Fair trade certification

Fair trade is about ensuring that there are decent working conditions, the payment of a fair return to workers and farmers and about ensuring a sustainable livelihood and empowering them, particularly in developing countries.

Fairtrade International (formally known as Fairtrade Labelling Organisations International (FLO)) is the international body made up of the Fairtrade Foundation and its partner organisations around the world. It is based in Bonn, Germany, and its commercial arm, FLO-CERT GmbH is in charge of the inspection and certification of farmers, workers and traders in developing countries.

Fairtrade Australia and New Zealand (Fairtrade ANZ) is a member of FLO and can issue fair trade certification in the Pacific and East Timor. Most of the European countries have their own Fairtrade organisation who are members of FLO. Fairtrade Label Japan and Fairtrade America are also members of FLO.

The fees charged by FLOCERT for small producer organisations, are outlined below in Tables 16 and 17:

Table 16: FLOCERT Fees: Small producer organisation

Initial certification fee (1st 12 months) – Note: Application fee €538		
Category	**Members (# of farmers)**	**Total fee charged**
A	<50	€1 466
B	50 – 100	€2 091
C	101 – 250	€2 306
D	251 – 500	€2 511
E	501 – 1000	€3 137
F	>1000	€3 557

Table 17: Additional Product Costs

Product Fee (first 12 months) – Note: Application fee €184		
Category	No of workers	Total fee charged
A	1 – 10	€215
B	11 – 100	€420
C	>100	€635

For a VCO establishment of 100 farmers, a processing facility that employs 8 workers and produces only one product (say VCO), the initial total certification costs will be €2 844. Annual ongoing costs will be €2 306 9 (AU$3 274)

Fair Trade Sustainability Alliance (FairTSA), a US based private commercial fair trade certifier, works only with organic certifiers. FairTSA is not a member of FLO. NASAA is the only organic certifier, among those discussed above, who is a member of FairTSA. FairTSA only charges a license fee to

cover the site inspection and audit costs. The license fee is 1 – 1.5 percent of the importers sales revenue. The license fee would be US$1 000 (1%) if the importers sales revenue were US$1 million.

In summary, organic certification appears to be the most important quality standard that will enable market access into Australia, New Zealand and other markets reviewed in this study.

3.3 Economic model for PNG VCO Producers

We have modelled the economic viability of a small producer of VCO. This gives us an indication of the likely margins, economic sensitivities and the volumes that a producer must sell to break even. We have used three scenarios:

- Exporting in bulk in using IBC (intermediate Bulk 1 000 litre containers)
- Selling in 500 ml glass jars in local supermarkets
- A 50% mix of exporting in bulk and domestic sales in supermarkets

We assumed that VCO would be manufactured to a food grade quality and that an appropriate investment was required in both equipment and building facility to produce a sufficient quantity to be able to meet an overseas customers demand expectations.

We further assumed that a complete production system for the fermentation method was purchased for a total cost of $US24 000 and that this equipment had a 5-year economic life. We also assumed that K100 000 would be required to develop and fit out a building suitable for food grade production of VCO and that this would have a 20-year life.

With this set of equipment, we assume that daily production of 160 litres of VCO could be achieved with six workers.

If the plant were operated for 260 days per year then total annual production capacity would be 38 tonnes. The equipment set is shown below:

Table 18: Economic Model – New VCO Producer Equipment List

Equipment Items	US$ Purchase Price	Capacity
Coconut Deshelling Machine COM20-2	1 750	Deshell 300 - 400 dehusked coconuts per hour. 2 deshelling heads.
Coconut Paring Machine COM32-4	2 400	Pare 400 - 500 deshelled coconuts per hour. 4 paring stations.
Coconut Kernel Washing Tank		
Coconut Grinding Machine COM41	2 400	Grind 140 - 180 kgs of desiccated coconut per hour.
Hydraulic Coconut Milk Press COM-MPH10	1 850	Container size = 15 inches. Motor : 2 hp
50 litres Stainless Steel Tank with Cover (US$150 X 15 units)	2 250	Tank capacity : 50 litres
50 litres Plastic Tank with Cover (US$35 X 30 units)	1 050	
Filter Press VCO450FP	5 500	Plate size : 450 X 450 mm. Capacity : 40 - 60 liters per hour.
Gravitational Filtering Rack with Plastic Tank and Filter Bag	1 250	
20 litres Plastic Tank with Cover (US$15 X	450	

30 units)		
Semi Auto Liquid Filling Machine FE13LF	5 500	
Filter cloth, scoop, sifter and other accessories	250	
Total Equipment Price	**US$24 650**	

Table 19 – VCO Producer Cost Inputs

Input Costs	
Labour costs (Minimum wage)	K 3.30 per hour
Coconut Purchase price	K0.30 per nut
Raw nut transport costs	K0.09 per nut
Conversion Rates	15 nuts per litre of oil
Label costs for domestic product	K0.10 per label
Glass Jar (500ml)	K2.80 per Jar
IBC (1000 litre – single use container)	K1 200 per IBC
Boxes for packaging	K10 per box
Transport cost to the nearest city	K330 per round trip

Table 20 - Wholesale Pricing Assumptions

Product Sold	**Wholesale Price per Container**
500 ml glass jar of food grade VCO	K9.00
1000 Litre plastic Cube of food grade VCO	K16.870 FOB This equates to US$5 500 per MT less an allowance for local shipping costs

Table 21 - Gross Margins Derived from Tables 13-15

Product Sold	**Gross Margin per Litre**
500 ml glass jar of food grade VCO	K4.11
Bulk	K8.72

In our modelling we noted that the container size can have a large bearing on the margin received. The margin for each container will be a function of both the price received and the handling and packaging required for each container.

Our observations of prices in the market indicated that some producers may have lower margins on smaller containers. Depending upon their packaging and labelling costs and the prices they charge.

Table 22 - Annual Costs for VCO Producer

Annual Costs	
Administration and office costs including manager's salary	K30 000
Product Testing	K6 600
Sales Development	K6 000
Organic Certification (assuming degree of cost sharing)	K5 000

Equipment Costs (annualised assuming a cost of capital of 12.5% and tax rate of 30%).	K29 280
Building Costs (annualised assuming a cost of capital of 12.5% and tax rate of 30%).	K17 236
Electricity Costs	K2 600

Table 23 - The result produced the following breakeven volumes:

	Domestic Only	**Export Bulk**	**Mixed 50%**
Breakeven Volume (MT per year)	15.4	8.8	13.0
Quantity of Raw coconuts required (MT per year)	195	96	143

There are a number of things to note about this analysis for a viable VCO producer in PNG:

- Some local producers may be able to operate on lower costs than we have assumed and thus find efficiencies that we have not built into our numbers.
- The analysis was extremely sensitive to inputs such as:
    - the price paid to the producer
    - the cost of labels and packaging
    - the cost of developing a food grade building facility
- It is also possible that a producer might be able to produce a similar quantity of VCO with less equipment. However to ensure this analysis was robust we assumed a complete system was purchased.

Since doing this analysis we have gathered more information about prices being paid in New Zealand and Australia. If prices for bulk product fell from US$5,500 per tonne to around US$4,000 per tonne then the breakeven volume would increase from about 8 MT to around 22 MT. The lower the price falls the more efficient a producer will need to become to breakeven. We also note that as international prices fall, domestic prices are also likely to come under more price pressure from imports.

From this analysis we conclude that a PNG based business should be able to sustainably produce VCO provided that each year they:

- Can continue to sell more than the break-even volumes of product.
- They can continue to receive prices which are equal those we have assumed.
- They can manage the cost of their production to be now higher than what we have assumed.

We have modelled the cost of production using the fermentation process. However, we have since learnt that some potential international buyers do not like this method of manufacture because of the resulting moisture content of the product, which tends to reduce its shelf life.

Further economic modelling may be needed to better understand the economics of alternative methods of production and to understand the scale required to be internationally competitive. This will become increasingly important if international prices fall.

4.0 Export markets

In the markets we are considering large amounts of coconut oil are imported and consumed. By contrast almost no copra is consumed. Our interpretation of this is that it is generally far more efficient to import oil then copra. Table 24 shows that many years most of these countries do not import any copra.

Table 24: Copra Imports (tonnes)

	2010	2011	2012	2013	2014
Australia	1 600	nil	2 560	nil	44
China	75	4	52	nil	nil
Japan	nil	nil	nil	nil	nil
New Zealand	nil	nil	1	nil	nil
USA	nil	nil	132	16	nil

The tables below show that several of the countries we are interested in import more than they consume. This is because manufacturers are importing raw materials and then exporting their finished products. For example we spoke to a New Zealand importer who imported bulk VCO from Sri Lanka into New Zealand for packaging and then exported it to Japan, Europe, Australia and the Philippines.

Table 25: Coconut Oil imports (1 000 tonnes)

	2010	2011	2012	2013	2014
Australia	15	15	15	20	16
China	307	170	208	131	139
Japan	47	46	44	42	49
New Zealand	3	3	3	5	4
USA	573	498	511	558	555

Table 26: Coconut Oil Consumption (1 000 tonnes)

	2010	2011	2012	2013	2014
Australia	12	12	15	11	13
China	197	193	150	140	136
Japan	46	43	44	47	54
New Zealand					
USA	486	515	540	513	558

To put the oil consumption of these countries in context Table 27 shows what proportion PNG's total coconut oil exports are as a % of each countries imports.

Table 27: PNG coconut oil exports as a % of countries total imports.

	2014 Imports (1000 Tonnes)	PNG 2014 total Exports (1000 tonnes)	PNG Exports as potential % supply of Imports
Australia	13	11	85%
China	136	11	8%
Japan	54	11	21%
New Zealand	4	11	368%
USA	558	11	2%

The purpose of this table is to show that the PNG export of coconut oil (11 000 tonnes) is significant compared to Australia's imports of 13 000 tonnes (85%) and in this case any significant proportion of PNG's exports would swamp the Australian market and so likely meet resistance from other exporters. New Zealand is a more extreme example where the PNG production is nearly four times the consumption in New Zealand. It seems that market opportunities are greater in the US and China where there would be a greater capacity to absorb this PNG product.

From this we can see that PNG could supply all of New Zealand's coconut oil, most of Australia's and a major portion of Japan's (although not at the same time). However, for the USA and China, which consume much larger quantities, PNG exports represent a much smaller portion. While purely academic, this comparison does indicate gaining a small share of a large market is likely to be easier than gaining a large share of a small market.

On this basis, the USA and China appear to be good target markets where significant growth for PNG would not change the market structure significantly in these countries.

In contrast, New Zealand and Australia would appear to be more difficult to achieve significant further penetration because any increase in crude coconut oil quantities into NZ or Australia on a meaningful scale for PNG, is likely to have a major impact upon these markets. This will often mean increased competition and lower prices and strong competitive responses from established suppliers.

Other major coconut product imports include coconut milks and creams and desiccated coconut.

Table 28: Desiccated coconut imports (MT)

	2010	2011	2012	2013	2014
Australia	8 778	9 375	8 996	9 151	10 192
China	2 986	2 063	2 778	4 914	5 632
Japan	1 867	1 730	1 979	2 289	3 033
New Zealand	1 592	2 100	2 159	1 780	2 131
USA	37 367	43 853	46 062	39 559	52 259

Table 29 - Overall VCO Retail Sales / Import volumes (MT) for each international market in 2015

	Market Size	Ranking	Remarks	Data Source
Europe	29 984	1	Retail Sales	QYR Food Research Center, Oct 2016
USA	23 650	2	Retail Sales	QYR Food Research Center, Oct 2016
Australia	3 379	3	Retail Sales	QYR Food Research Center, Oct 2016

Japan	953	4	Retail Sales	QYR Food Research Center, Oct 2016
New Zealand	42	5	Imports	Statistics New Zealand

4.1 Australian market

Australia has very limited scale commercial cultivation of coconuts and accordingly, most coconut and derivative products are imported from Asia and the Pacific islands.

The markets for coconut products in Australia include:

- Refined, Bleached or Deodorised Coconut oil
- Virgin Coconut Oil
- Crude coconut oil
- Desiccated Coconut
- Copra
- Fresh mature coconuts
- Canned or UHT coconut cream/milk for consumer and restaurant sectors
- Coir matting for building and furnishing uses
- Activated carbon

Table 30: Imports into Australia by product and country of origin (tonnes - 2015)

	Vietnam	**Thailand**	**Philippines**	**Indonesia**	**India**	**PNG**
High Grade Coconut Products[7] (e.g. VCO)	77	81	912	119	327	124
Unprocessed Coconut Products[8]		3		2	0	25
Soap Products[9]		5 126	23	3 202	570	0
Desiccated coconut[10]	115	0.3	7 900	2 171	27	0

Source: Australian Bureau of Statistics – Sample Countries Exporting Coconut Products to Australia

Notes:

1 - The Harmonized Commodity Description and Coding System codes are how the Australian Bureau of Statistics describes the types of imported coconut product in Table 25 above, and are groupings of the products discussed in this paper. Footnotes describe the product categories.

2 – Sample countries are chosen because they appear to have strong production capabilities, acknowledge quality systems and are acceptable to Australian importers. These may be the key competitors for export into Australia of coconut products for PNG. However, it is noted that there current some current niche coconut oil imports into Australia from other PIC's e.g. Solomon Islands.

[7] 1513190027 Refined coconut products, not chemically modified
[8] 1513110026 Crude coconut products, not chemically modified
[9] 3401110001 Soap in the form of bars, cakes, moulded pieces or shapes, for toilet use (incl. medicated products)
[10] 0801110034 Desiccated coconuts

Table 30 illustrates some important points discussed elsewhere in this document:

- PNG is a relatively important provider of unprocessed coconut products, but these products have a relatively low export value.
- High grade coconut products from PNG are 7.6% of imports from the sample countries, meaning a material increase in imports from PNG would not necessarily disrupt the market in Australia.
- Soap products with coconut ingredients are relatively large areas of import from the sample countries, with very low or no imports from PNG.
- Desiccated coconut is a large import for Australia for which PNG is not a significant producer.

There is no import duty on products sourced from the Pacific Islands into Australia.

VCO data obtained from a private commercial source (QYR Food Research Center, Oct 2016) estimated retail sales in Australia at 3,379 MT in 2015 and projected it to grow to 3,720 MT by 2021.

The two major quarantine/health concerns for coconut products concern African Snail and Salmonella, in particular for Copra and Desiccated coconut. Apart from close Australian Quarantine scrutiny, importers generally have their own quality and health and tests.

We interviewed three importers[11] of coconut products – largely coconut water and VCO - in Australia and received the following common messages:

Competitive Market: There are increasing opportunities to import high quality coconut products from the following countries as producers work to meet international demand:

- Indonesia - very large producers of coconut water of good quality
- Vietnam – relatively new exporter of coconut water and VCO. Prices are very competitive and logistics (prompt supply in any quantity) are good
- Thailand – considered the benchmark for quality
- Sri Lanka – a successful exporter to Australia
- India - a successful exporter to Australia

These countries set standards that PNG must match in order to export to Australia. There is a high level of confidence with the quality and price competitiveness of coconut products from Indonesia, Thailand and Vietnam.

Quality standards are crucial – the importers views were that without proven compliance with BRC/ISO or other accepted standards, PNG will experience difficulty in competing with other exporters. All three look for factory certification before they approach a potential export partner. An example of the import position taken by a typical Vietnam exporter[12], they offer the following quality accreditations ISO 9001:2000, GMP, HACCP, HALAL, KOSHER and ORGANIC certification. Whether these quality accreditations are actually in place, this presentation by an exporter is exactly what the three importers in Australia that were interviewed have said they value before making contact.

Packaging has been a problem for importers and they are alert to problems that can arise with product imported in bottles. Containers, whether bulk or in retail size bottles must be pasteurised at source.

Trade Shows are an important way that the Australian importers access the potential to partner with an exporter. The importers interviewed all attend Asian trade shows looking for export partners. One example of a trade show they are likely to attend is http://www.figlobal.com/asia-indonesia/.

Figure 4 shows the process all interviewed importers agree they use to understand the export market.

[11] Coconut Essence (www.coconutessence.com.au), Miessence (www.miessence.com.au) and H2Coco (www.h2coconut.com)
[12] Viet Delta Corporation - http://coconutvietnam.com.vn/about-us.html

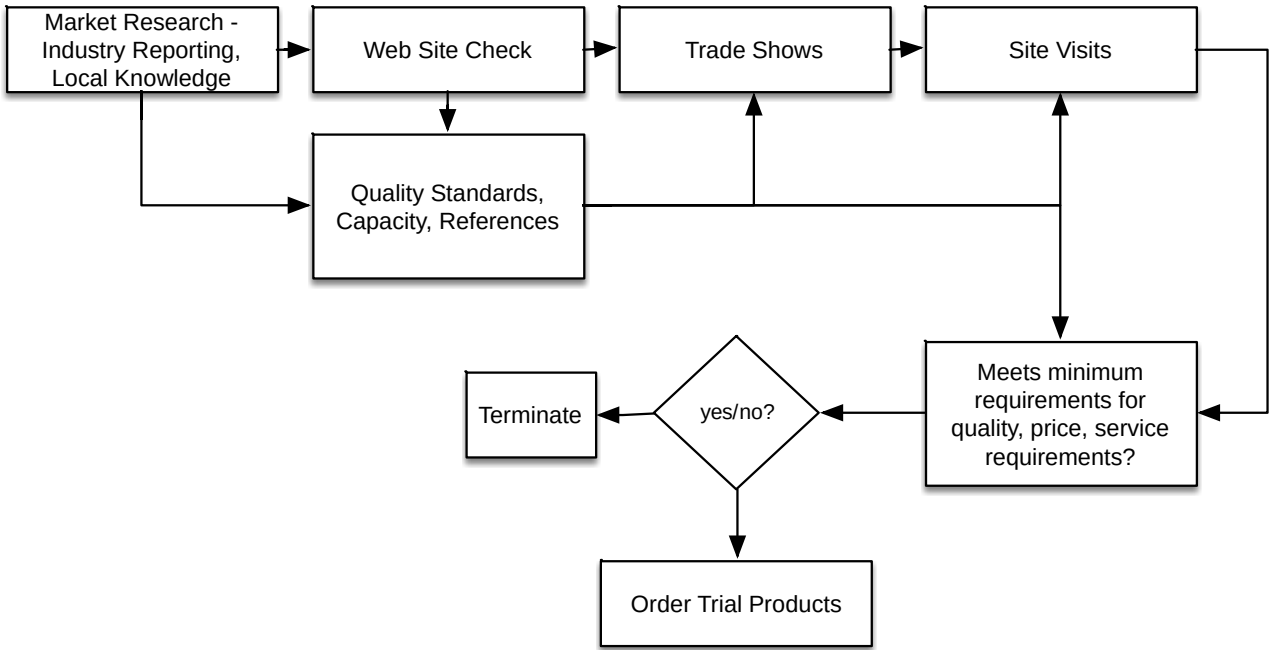

Figure 4 – Australian Importers Review and Selection of Export Partners

This process requires any exporter of high-value coconut products to pass the following tests as an importer identifies new partners:

1. A compelling web site which could be associated with the Kokonas Indastri Koporesen web site, along with at least a Facebook page for the grower[13] where there are nearly 200,000 consumers and producers following market news. In our view, a good example that importers will find that meets their base needs to enquire further is Merit Foods in Thailand: http://www.meritfood.co.th/aboutus.asp. This company wants to export, provides all the relevant information about its capabilities and quality certifications and seeks enquiries.
2. Attendance at Trade Shows. All our Australian importers either attend Asian trade shows or they seek information from this that do. Most of the credible companies found on the internet (web sites and social media) do attend some trade shows according to our interviewees. Pacific Trade and Investment (Sydney) facilitates three trade fairs annually: Beauty Expo, Fine Food Australia and Marketi Ples. Attendance by PNG SMEs is recommended.
3. Site visits. Figure 4 shows that site visits are often made, usually after the successful ordering of trial products, but this may happen before products are ordered.

Perceptions of PNG were that it may not meet the same standards of reliability and quality assurance offered by Vietnam and Indonesia for example. We conclude this discussion on the interviews with Australian importers as follows:

PNG is not seen as an alternative to the larger and more well established exporters. This is because of a lack of knowledge of the country in this context and perceptions of potentially poor reliability with logistics and quality. Because the larger exporting countries are actively competing for business with importers, none of the interviewed companies had any serious intent to consider PNG high-value coconut products for import. None of the existing importers of PNG coconut products identified were willing to provide detailed feedback on any issues or capacity to increase imports sourced from PNG.

[13] https://www.facebook.com/search/top/?q=coconut%20water - 91,000 followers
https://www.facebook.com/search/top/?q=coconut%20water - 92,000 followers

4.1.1 Market structure

The most noticeable coconut product in Australia is milk/cream, (commonly sold through supermarkets and specialty food stores), the demand for coconut oil is substantial. Major coconut oil users such as Unilever and Meadow Lea centralise purchasing, often outside Australia.

Apart from extra virgin coconut oil, most coconut oil is shipped in bulk and requires on-site inspection to assure the quality of the product. Specialist importers of oil such as www.gardnersmith.com.au operate in Australia alongside the major vegetable oil users (Meadow Lea & Unilever) and the market is tightly held.

4.1.2 Product range

Table 31: Coconut Products Samples in Australia

Brand and Name	Product	Source
Zico Coconut Water	Coconut Water	USA
H2Coco	Coconut/chocolate water	Australia, NSW
TCC	Coconut/chocolate water	Thailand
Beyond	Coconut Water	Australia
OGX	Coconut Water, beauty products	USA
Planet Food	VCO	Australia, Vic
Maharaja's Choice	VCO	Australia, Vic
Melrose Organic	VCO	Australia, Vic
Trident	Milk	Australia, NSW, New Zealand, Auckland
TCC	Milk	Thailand
Ayam	Milk	Nine countries, including Vietnam, Thailand, Malaysia
Spiral Foods	VCO – sourced from Philippines	Australia, Vic
Cocobella	Coconut Water	Australia, Vic
McKenzies	Desiccated coconut	Australia, Vic
RawC	Coconut water – sourced from Thailand	Australia
Nature Pacific	VCO	Fiji
Banaban	VCO	Sri Lanka
Niulife	VCO	Solomon Islands

4.1.3 Commentary on the market

The coconut product market in Australia has the following characteristics:

- Limited variety of retail products such as coconut water and VCO. Most brands appear in both Woolworths and Coles for example. This may indicate a lack of buyer discrimination – they are more likely looking for a 'coconut' product rather than a brand. Pricing for coconut water varies from $5.07 to $6.60 /liter for unflavoured water in Coles supermarkets. There do not appear to be any high cost specialty coconut water products in the two main supermarkets – Coles and Woolworths.

- Australia produces a majority of its own retail coconut products, as shown in table 31, with 12 of the 18 retail products produced in Australia with input from Thailand and the Philippines most common.
- About half the Australian producers of retail products appear to specialise in coconut products and so may be more open to an alternative input provider (from PNG).
- Australian importers of VCO seek ideally cold pressed VCO, must have organic certification, HACCP quality certification and a subtle coconut smell. They are not aware of this level of control and characteristic in PNG and so do not rate the country as a viable source of VCO.
- Fiji has been a reliable source of cold pressed VCO for several importers in Australia, and so PNG could carry out a detailed assessment of the Fiji production and control situation as an accepted supplier that could be competition for a renewed PNG export business. Nature Pacific is a potential importer of VCO from PNG to balance their imports from Fiji.
- Kokonut Pacific Solomon Islands is another PICs based exporter of VCO to Australia whose production and marketing could be researched by potential PNG exporters.
- Lower cost organic VCO is coming onto the market from Coles and Woolworths who buy from local producers who are buying in bulk from Sri Lanka for example, to meet the wholesale price points set by Coles and Woolworths.
- The retail market separates into the large national retailers (Coles, Woolworths) who drive pricing down and force local producers to buy from large producing countries such as Sri Lanka, and specialist health food stores who will not compete on price so they look for quality and differentiation.
- Advice from importers is as follows:
    - Focus on the domestic PNG market as far as possible, and then compete with other Pacific Islands exporters into the Australian market.
    - PNG will not match the volume wholesale prices achieved by producers serving the large retailers

Focus on quality, local relationships, PNG differentiators.

4.2 New Zealand market

4.2.1 Imports

Table 32 shows the quantity of coconut products imported into NZ over the last three years. Total coconut product imports declined during this period. Coconut Oil imports fell by 30% from 2013 to 2014, but increased again in 2015.

Table 32: NZ Coconut Import quantities by Customs Classification

Coconut Product	Units	2013	2014	2015
Crude Oil	Litres	447 880	270 229	368 563
Oil Fractions	Litres	178 669	17 377	63 854
Other Coconut Oils	Litres	4 454 577	3 271 916	4 284 722
Total Oils	Litres	5 081 126	3 559 522	4 717 139
Desiccated Coconut	Kg	1 746 166	2 077 255	2 145 839
Raw Coconut	Kg	1 016 338	1 298 637	1 114 407
Edible Mixtures	Litres	1 276	1 876	45 882
Oil Cake	Kg	2 426 931	1 104 149	542 996
Food Preparations not covered elsewhere (This includes Coconut Cream)	Kg	3 866 305	5 193 404	5 543 673

Total – Excluding Food Preparations	Kg & Litres	10 271 837	8 041 439	8 566 263

Note: Our interpretation of the NZ Harmonised System Classification for tariffs indicates that VCO will be included in other coconut oils. We estimate that total VCO imports are currently around 40 MT per annum this will represent about 1% of the other coconut oil volume.

Table 33: NZ Coconut Product Imports by Country of Origin

	Desiccated Coconut kg	Raw Coconut kg	Crude Coconut Oil Litres	Coconut Oil Fractions Litres	Other Coconut Oils Litres	Oil Cake Litres	Total
Malaysia	0	0	43	63 608	3 833 256	0	3 896 907
Indonesia	1 390 397	0	0	0	87 605	0	1 515 627
Philippines	642 712	72 786	11 080	0	78 284	1 616	812 764
Tonga	0	719 354	360	0	0	0	719 714
Sri Lanka	104 657	3 080	9 970	0	191 697	3 732	313 136
Marshall Islands	0	0	0	0	0	252 850	252 850
Thailand	124	232 635	2 848	0	2 279	1 382	239 907
Solomon Islands	0	0	194 968	0	0	40 000	234 968
French Polynesia	0	0	0	0	0	198 000	198 000
Papua New Guinea	0	0	119 942	0	32 299	36 000	188 241
Fiji	24	47 113	5 476	0	28 718	0	81 331
Samoa	0	16 617	21 000	0	2 570	0	40 567
Trinidad and Tobago	0	21 520	0	0	0	0	21 520
Australia	3 991	0	1 672	40	4 602	9 416	20 673
Viet Nam	1 515	0	0	0	14 401	0	15 916
Other Countries	2 419	1 302	1 204	206	9 011	0	
Total	2 145 839	1 114 407	368 563	63 854	4 284 722	54 996	8 566 263

From Table 33 we can see that Malaysia, Indonesia and the Philippines are the largest suppliers of the coconut products to the NZ market. However Sri Lanka is the largest supplier of Coconut Oils to NZ.

For products such as desiccated coconut and coconut creams and milks the market is mature but still growing. Suppliers need to have economies of scale to be price competitive in what is already a mature market. We have not focused upon these products because we think it would be difficult for new businesses to enter this market at this time.

4.2.2 Market trends

In NZ, health and safety concerns have seen buyers and consumer place greater emphasis on knowing about the ingredients and the production process of their food. Coconut is increasingly considered to be a healthy food, although this is not universal. But there is a shift in the market toward high-value food uses for coconuts such as tender coconut water.

Certification and quality assurance programs are becoming more important (e.g. HACCP, organic / fair trade certification) but only for some products.

However, price continues to be the main determinant of the average household purchasing decision. Consumers have taken charge of their shopping experience and use their smart phones frequently while shopping to compare prices.

In general NZ importers are interested in building long-term relationships with their suppliers. Communication and coordination are important particularly during the trial shipments. To develop a new supply relationship it is an advantage to meet face to face to discuss opportunities.

To retailers, the brand they stock is very important as they try to establish a point of difference with their customers. For this reason, the quality of the packaging and certifications such as organic or fair trade will be crucial for some, but not for everyone.

Wholesalers and importers are increasingly looking to suppliers to provide support for in store promotions during product launches. This might include price discounts or giveaways.[14]

4.2.3 Market structure

Two supermarket chains dominate NZ:

- Progressive enterprises is an Australian owned company who operate the Countdown chain of Supermarkets; and
- Foodstuffs is a New Zealand owned cooperative and operate two brands – New World and Pak n Save.

Both companies have reputations for being aggressive negotiators with their suppliers. While we do not have exact figures for market share we expect that these two companies make more than 95% of all grocery sales by quantity. A study carried out by the Health Promotions Agency (2012) found that most people (86.9%) said that their households purchased food and drinks from supermarkets weekly or more often.

Both companies have their own in house brands for a wide variety of products. These brands compete directly against third party brands. This includes some coconut products such as Countdown's "Macro Virgin Coconut Oil" and New World's "Pams Coconut Oil". Over time the supermarkets have increased their level of vertical integration, by manufacturing their own products. Although third parties under contract generally make these products, they are made to the supermarkets specifications.

NZ Supermarkets stock a similar range of Coconut based products as in PNG supermarkets. This includes

- Fresh Coconuts in their husks
- Coconuts in their shells
- Coconut Milk and Coconut Cream (canned)
- Coconut drinks
- Desiccated coconuts
- Coconut oils for cooking and food consumption
- Skin care products
- Soaps and shampoos

In the last month Coconut yoghurts have also started to appear beside other yoghurt products in all the supermarkets.

In addition to the supermarkets, there are also smaller alternative grocery shops, health shops, pharmacies and beauty shops that sell coconut based products.

Consumers can choose to purchase coconut products on-line from manufacturer's websites and have them delivered to their home. Delivery charges will depend upon the consumer's location but would

[14]Pacific Islands Trade and Invest "Exporting Coconuts to New Zealand" Brochure.
New Zealand Retailers Association, the Retail Market in New Zealand: An Analysis 2011/12

generally cost between $3 and $7 to be delivered. We would expect the bulk of coconut products to be sold through supermarkets. Table 22 sets out coconut retail products found in retail positions in New Zealand.

4.2.4 Survey of NZ suppliers and coconut oils

A survey of NZ retail outlets identified 11 suppliers of coconut cooking oils as shown in Table 34. Except for Niugini Organics, all of these companies purchase their coconut oil at arm's length from third parties. Therefore there is a potential long-term possibility that they could buy product from PNG, if the supplier could meet their requirements.

Niugini Organics (http://www.niuginiorganics.com/ and http://www.niuginiorganics.co.nz/) a company that provides HVCP in both the Australian and NZ markets via specialty retail shop distribution relationships and via online sales is an excellent example of how well produced and marketed PNG HVCP's can be sold into the these markets and potentially broader.

Table 34: New Zealand Coconut Suppliers

Brand and Name	Product	Source
Blue Coconut	VCO and Refined Cooking Oil and Animal Products	Pacific Islands (identified by batch). Packed and refined in NZ
Cathedral Cove Naturals	VCO	Sri Lanka Packed in NZ
Chantal Organic Wholesalers	VCO and Refined	VCO Philippines (Packed in NZ)
Harvestoil (Natural Sugars NZ ltd)	VCO and Refined	Refined and packed in Sri Lanka
Hebe Bontanicals	VCO	Solomon Islands
Macro (Countdown)	VCO	Sri Lanka (Packed in Australia)
Olivado	VCO and Refined	Sri Lanka (refined and packed in NZ)
Pams (New World)	Refined	Refined and Packed in Sri Lanka
Simply (owned by Wilmar Foods Ltd – Singapore based also own Chelsea sugar)	VCO and Refined	Product of Vietnam
Trade Aid (Trade Aid Importers Ltd)	VCO	Packed in India
Niugini Organics NZ	VCO	Packed in PNG

From the above table, we can observe that Sri Lanka is the most common source of coconut cooking oil. Six of the 11 suppliers purchased their product from Sri Lanka. However, there was a mix of preferences for the packing location with six of the companies choosing to pack their own product.

Most of this imported product is consumed in NZ, but we did speak to one company who was re-exporting to Japan, Europe and the Philippines.

We attempted to contact 8 of these companies. Five of them answered our questions, two declined to talk to us, and one was not contactable. All of our contacts were cold calls with no prior relationship to the companies contacted.

Price Range

Tables 35 and 36 shows the price range for VCO's.

Table 35: NZ Observed retail prices for VCO cooking oil

Product	Type	Price $NZ	Package Size (litres)	Price NZ$ / litre
VCO	Organic	$11.99	0.250	$47.96

VCO	Organic	$22.40	0.500	$44.80
VCO		$8.79	0.200	$43.95
VCO	Organic	$11.99	0.320	$37.47
VCO		$17.99	0.500	$35.98
VCO	Organic	$22.99	0.650	$35.37
VCO	Organic	$12.29	0.400	$30.73
VCO	Organic	$29.99	1.000	$29.99
VCO		$9.79	0.375	$26.11
VCO	Organic	$89.99	5	$18.00

Table 36: NZ observed retail prices for refined coconut cooking oil

Product	Type	Price $NZ	Package Size (litres)	Price NZ$ / litre
Refined		$8.79	0.320	$27.47
Refined	Organic	$11.99	0.450	$26.64
Refined		$8.99	0.450	$19.98
Refined	Organic	$6.99	0.400	$17.48
Refined		$6.99	0.400	$17.48
Refined		$5.99	0.400	$14.98

From the above list we see that prices varied considerably. From this range of prices we note that:

- VCO was generally more expensive than refined oil.
- Some times bigger containers are cheaper on a per litre basis. But not always.
- Organic product did not sell for higher prices than non-organic product.

Choice of suppliers

When we asked the importers how they chose their suppliers, there were several common themes.

Table 37: Importer Requirements

Price Competitiveness	Most importers mentioned price as an important consideration. Over the last two years the prices available to importers appeared have fallen from around $US5.50 per kg to $US 3 – 4 FOB.
Reliability	Importers needed to be able to rely upon suppliers to deliver orders within a reasonable time frame. One had changed suppliers because product had never shown up. Some importers prefer a single supplier. This simplifies labelling requirements. Others did not mind having more than one supplier as long they supplied the quantity that was agreed upon. Good communication was essential with any problems being identified immediately. None of the importers said they had minimum order quantities. The generally accepted lead-time was 6 to 8 weeks from the order being placed to the product being delivered, 3 or 4 weeks of this being shipping time.
Method of manufacture	Some importers had preferred methods of manufacture for VCO. For example, one supplier would not purchase VCO made from the fermentation method because

	moisture levels were too high and shelf life was consequently affected.
Contact with Suppliers	Most of the importers wanted to develop long-term relationships with their suppliers. Some would visit them every year with one visiting twice per year. All talked about the need for good regular communication especially in regard to the status of orders. One importer recently started up a new supply arrangement with a Sri Lankan supplier. While they knew of four potential companies in Sri Lanka who could supply them, this one had sent someone to visit them in NZ. They saw this as a sign of commitment.
Product Quality	All importers had a focus on product quality as would be expected for any food grade product. All the importers favored site visits. Although they did not always find time to carry them out. They generally wanted to know that the manufacturing site was clean, staff were well trained and the environment complied with food standards. Most required HACCP certifications and some required international bodies to inspect premises. One importer was ISO 2200 accredited. One importer had changed suppliers because their original supplier's product had gone rancid. Another supplier had, had problems with product not being stored at a constant temperature. Consequently, it had solidified and thawed out several times. This drew out the moisture in the product and the product went moldy. Half the suppliers chose to refine and package their own product to have control over product quality.

In general it appears that supplying VCO to the New Zealand market has become far more competitive over the last two years. One importer commented that a couple of years ago a producer could start up on a small scale making VCO using the fermentation method, but now this was too difficult for most as the product had to be much higher quality (lower moisture) and prices were now much lower. While they said they were still interested in finding new producers, they thought it was now far less likely that new entrants would succeed.

All importers are primarily in business to make a profit. However, some also have other motives. Trade Aid only chose suppliers where trade had the potential to make a difference to the quality of people's lives in the local area where the product was produced. While issues such as price and product quality were still important to this supplier the underlying theme of helping a community was essential. This importer also preferred to buy packaged product because it gave the supplier the opportunity to add additional value to their product and create additional jobs in their community. This importer has a specialized brand and does not sell through the main retail outlets. Their prices tended to be higher and their sales volumes consequently lower.

Table 38: NZ Customer Preferences

VCO vs Refined	There were mixed views about whether customers knew the difference between VCO and refined coconut oil. We suspect that the importers who said their customers knew the difference tended to have smaller niche brands. The common approach to explaining the difference to customers is that VCO and refined coconut oil are mostly the same except that VCO smells and tastes like coconuts while refined does not. There is a segment of the market that do not like the taste of coconut and so this appeals to them. One importer believed that while about 50% of their current coconut cooking oil sales is VCO, eventually it would only account for about 25%, with customers opting to buy the cheaper refined product.
Organic Certification	Customers who are focused on Virgin Coconut oil as a health product prefer it to be Organic. For this part of the market organic certification is crucial and the norm. However, one supplier commented that if a product is classified as organic the super

	market puts it in the health food section rather than with the other cooking oils. This means that sales volumes will generally be lower. Therefore, they often do not brand their product as Organic even though it is.
Fair Trade	Views about the value of "Fair trade" were mixed. One importer commented that while it was important for coffee, it did not make a lot of difference for coconut oils. Another thought that while "Fair Trade" didn't necessarily make much difference the more certifications you could put on the label the better. An importer also expressed the view that the supermarkets themselves did not value the Fair Trade brand and that the owners of the Fair Trade brand had not understood the dynamics of the supermarket.
Traceability	Two of the importers we spoke to rated Traceability as very important. However, this was from a food safety perspective rather than being a customer preference. They wanted to be able to say where the product came from, which batch, which jar it was put into and who it was sold to. This is likely to be a consequence of the history of food products needing to be recalled in NZ.
Marketing & Promotion	Three of the importers we spoke to were looking for good stories about the origin of their cooking oils. The words authenticity and genuine were used. A variety of forms of promotion were used ranging from in store promotions involve discounts and rebates, use of social media and sponsorship of TV cooking shows that used coconut oils in their recipes.
Growth Potential	There were mixed views about how much further growth potential there is for coconut cooking oils. Two importers said that while growth had been very strong until now, they expected it to tail off. Two others were of the view that there was still plenty of opportunity for growth. One thought it would depend upon further coverage by the public media about coconut oil's health benefits. Another importer observed that individual brands may see their growth tail off because of the entry of new brands.

Pacifica is a trade fair which is held in New Zealand in March of every year. This is a highly recommended forum for PNG SMEs to attend to meet potential buyers.

4.3 China market[15]

4.3.1 Imports and local production

The Hainan province of China supplies approximately 250 million coconuts per year, however China also imports 2.5 billion coconuts to meet domestic demand.

In 2015 VCO imports into china fell dramatically from 125 000 tonnes per year to about 30 000 tonnes. The exact reason is not clear, but it does seem that manufacturers decided to use refined coconut oils instead of VCO mostly because it was cheaper. VCO prices also fell and in 2015 were about 1145 US /tonne. This is not surprising as China is generally regarded as a very price sensitive market for most products. According to Hughs (2016), this market has not been exposed to the publicity around the health benefits of VCO compared to RBD yet.

[15] Source information for this section is taken from a report by Yolanda Jiang and Zhenzhen Fu "Exploring the potential for developing exports of coconut products to China" prepared for Department of Foreign Affairs and Trade June 2016

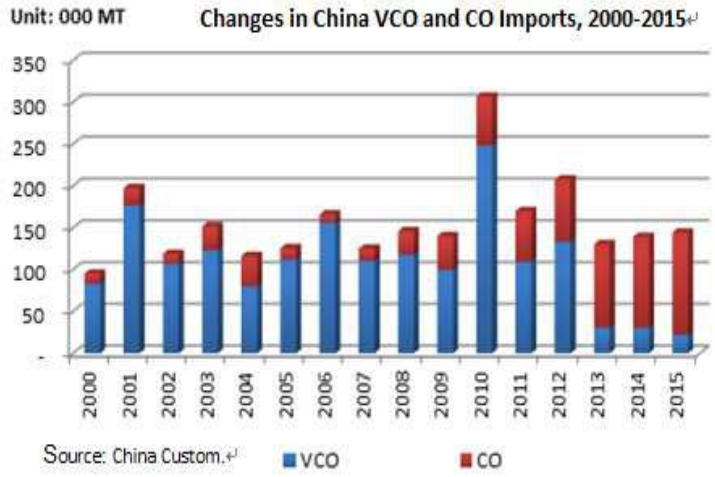

Figure 5 – China Market VCO and CO Imports

Most VCO imports come from Indonesia.

4.3.2 Market structure

Currently coconut oil processing is concentrated in the Hainan province. It is mostly used as an edible oil followed by skin care and health food consumption.

The market for direct consumer consumption does not appear to be well developed. While it is sold in shops and supermarkets it is not always easy to find. Prices for 500ml are about 42 US$ on average. In Hainan, most products from the small family workshops bear no brands and their packaging is simple. However, customers can buy foreign brands on line where prices tend to be higher.

Kerry Oils & Grains and COFCO Donghai Grain & Oil are the largest special oil/fat producer and importer of coconut oil in China. Their products are supplied mainly to the catering industry and bakeries, and are not sold directly to consumers at the retail market.

Trading companies such as China National Light Industrial Products Import & Export Corporation, SDIC and Houman Shengmu (Shanghai), sell oil to cosmetic companies.

Companies such as UniLever and NICE Chemical Industry C. Ltd also use coconut oil in the manufacture of daily detergents and other cleaning products.

4.3.3 Commentary on the market

Overall it appears that selling to China will be difficult for PNG suppliers.

- Most VCO consumption is by large companies who purchase large quantities who may be likely to focus more on price than quality. As already seen a large portion of the imports of VCO have now been replaced with refined coconut oil. We expect that it would be difficult for PNG to compete in this industrial market because these customers will not value the unique properties of the PNG VCO brand.
- The direct consumer market is poorly developed with low consumer awareness of the VCO or its properties. PNG does not have the resources to develop consumer awareness in such a large country.
- China is a difficult place to develop business relationships without internal support. And local language barriers are another difficulty to overcome.

In our opinion there are other markets that are more attractive for PNG to pursue.

Another study sanctioned by the Melanesian Spearhead Group (MSG) also did not recommend China as a priority market for VCO for the following reasons:

(1) The perceived lack of awareness of the quality difference to RBD[16],

(2) The 9% duty, and

(3) The presence of some of the cheaper South East Asian suppliers already. The relatively high retail prices are attractive to exporters but these prices may also be preventing the growth of the VCO market, as the average Chinese consumer would not be able to afford it. The retail price for a 400g jar is around CNY130 (AU$25).

PNG SMEs may be able to compete in the Chinese market if they are prepared to invest in the marketing required, and could find distributors that catered to wealthy health conscious consumers. PNG SMEs need to clearly differentiate their product from the South East Asian competitors through well-designed packaging, point of sale promotion and social media. The only Chinese importer[17] interviewed by Hughes suggested that MSG producers could export to China through contract packers in Australia and New Zealand. The duty can be avoided through this arrangement. China has a free trade agreement with Australia and New Zealand.

4.4 USA market

4.4.1 Market structure

Unlike countries such as Australia and New Zealand, the retail industry in the US is more competitive with several large players in the industry. According to the 2016 top 100 World's largest retailers list[18], over 30 percent of the retailers listed are from the US - with the top three positions been taken up by America's three biggest supermarket chains Wal-Mart, Costco and Kroger. Home Depot (home improvement retailer), Walgreens (largest drug retailer in the US), Target and Amazon.com (online retail company) are ranked 9th, 10th, 11th and 12th respectively. Other US retailers ranked in the top 100 include CVS Caremark (drug store chain), Lowe's, Best Buy, Safeway, Sears Holdings, Publix (supermarket chain), TJX, Macy's, Rite Aid, H.E. Butt Grocery Company, Kohl's, Dollar General, The Gap, Meijer, Whole Foods Market, Nordstrom, JC Penney, BJ's Wholesale Club, Bed Bath and Beyond, Staples, Southeastern Grocers (Bi-Lo Holdings), L Brands (Limited Brands), Ross Stores, Liberty Interactive Corporation (QVC), and Family Dollar. The above rankings were based on 2014 retail sales revenue.

An internet search of their respective websites reveal that they all stock VCO and coconut products of some description. Home Depot for example, stock coconut charcoal, coconut fibre products such as coconut peat, coconut mats, coconut shell blinds, coconut plant baskets, coconut ropes etc. Wal-Mart, Costco, Kroger, other grocery retailers and drug store chains stock VCO, coconut water, milk, cream, lotions, body oils, lip balm, facial cream, shredded coconut, desiccated coconut, flour, sugar etc. Walgreens and CVS for example specialise in coconut cosmetic products such as lip balm, body wash, body lotion and facial creams.

4.4.2 Imports and market size

The US is not a known coconut producer. Tropical Traditions[19] imported the first "virgin coconut oil" products from the Philippines to the U.S. in 2001 and according to them; at that time there were only two other refined edible coconut oils commercially available in the US market[20].

Since 2001 the number of and range of VCO products and coconut products have increased enormously in the US. Every possible product from the "tree of life" is now available in the US market. It appears that a large proportion of the coconut products stocked by US retailers are packaged in the

[16] Hughes suggests that this perception needs to be verified through consumer research.
[17] Global Village
[18] https://www.thebalance.com/largest-us-retailers-4045123
[19] Tropical Traditions was founded by Brian Shilhavy in 1998 with his Filipino wife. He lived among coconut farmers in the Philipines in the 1980s and 1990s. The company is based in California and sources bulk VCO from the Philippines, packages and distributes the products in the USA since 2001.
[20] http://www.tropicaltraditions.com/coconut-oil/what-is-virgin-coconut-oil.html

US by US companies with bulk organic VCO and raw coconut by products imported from processors in Asia, the Pacific and South America. Some of these companies include Carrington Farms, Natures Way, Tropical Life, LouAna, Sprectrum Naturals, Better Body Foods, Spring Valley Organic Extra, Shea Moisture, Tresomega Nutrition, Nutiva Organic, Crisco, Kirkland Signature and Deep Sheep.

Fresh and packaged coconut water is sourced mainly from Brazil. Costco for example, stocks a 1-gallon VCO packaged by Nutiva Organic for US$69.99 from bulk VCO imported from Philippines, Indonesia, India, Sri Lanka and Vanuatu. Kirkland Signature supplies Costco, an 84 oz. packaged organic VCO for US$64.99 from VCO sourced from the Philippines and Vietnam.

Figure 6 below shows the volume of VCO sales and growth in the US. Overall the demand has been growing at about 1.7 percent per annum between 2011 (23,133 MT) and 2015 (23,650 MT). Demand is projected to increase at an annual rate of 2 percent between 2016 (23,834) and 2021 (26,042 MT). Since 2001, the demand for virgin coconut oil has steadily increased each year in the United States[21].

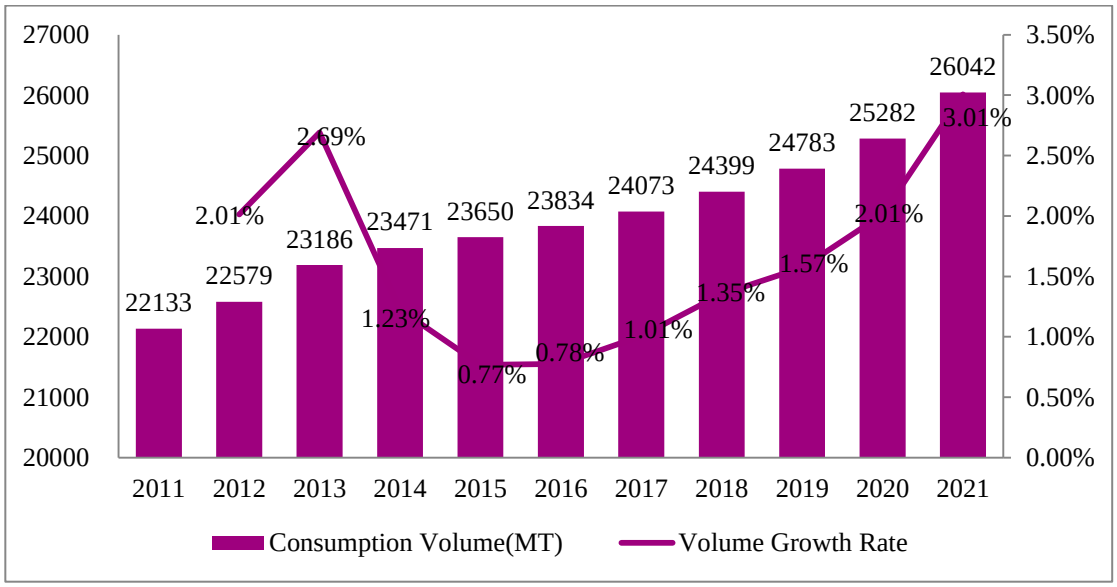

Figure 6 USA Virgin Coconut Oil Sales and Growth Rate (2011-2016)[22]

The size of the US market is second only to the European market. However, on an individual country basis, the US is by far the biggest market for VCO. The size of the market has grown from US$148.96m in 2011 to US$162.67m in 2015, about 2.3 percent growth per annum. The market is projected to grow at the slightly accelerated rate of 2.6 percent annually between 2016 ($164.93m) and 2021 ($186.54). However, recent reports indicate that current supply is lagging behind demand due to the fact that much of the production is still done at the small-scale level and that the majority of coconut trees in the coconut producing countries have gone past their productive age[23].

[21] http://vdeltafuel.com/news/virgin-coconut-oil-vco-new-products-of-high-value/48.html
[22] QYR Food Research Center, Oct 2016
[23] http://vdeltafuel.com/news/virgin-coconut-oil-vco-new-products-of-high-value/48.html

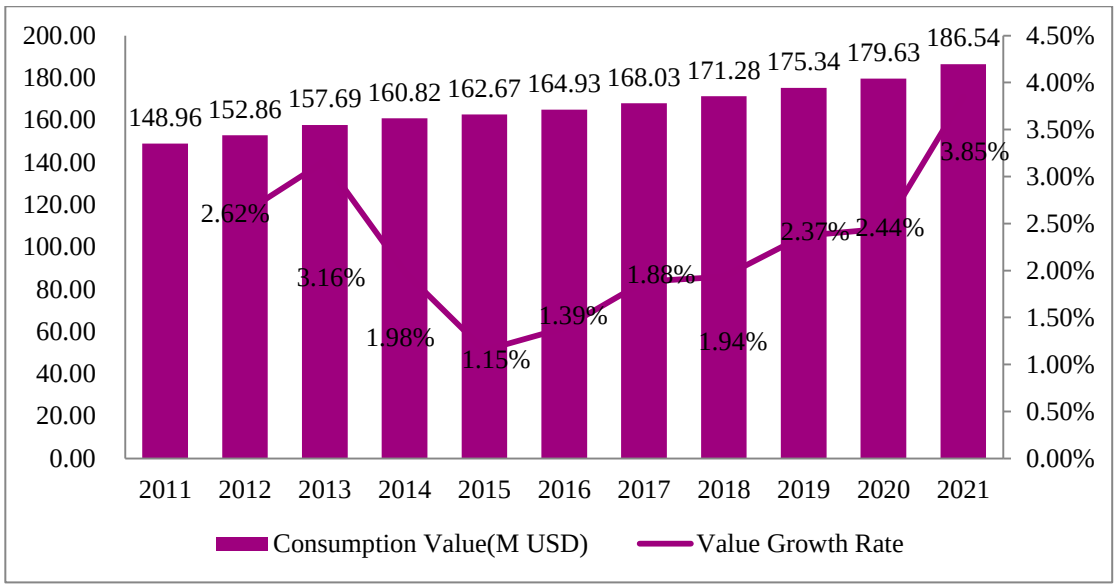

Figure 7 USA Virgin Coconut Oil Revenue (Market Size) and Growth Rate (2011-2021)[24]

4.4.3 Market trends

Demand in the US has been largely driven by the revival in the health and cosmetic benefits of virgin coconut oil and the myriad of uses and applications for coconut by products. The USDA dietary guidelines issued back in the 1970s blamed heart disease on saturated fats (the lipid theory of heart disease) and refined coconut oil from copra oil was demonised by this belief in the 1970s, 1980s and the 1990s. The dramatic increase in diabetes in the US, for example, has been attributed to these guidelines. Modern research[25] has discredited this theory.

More and more consumers in the US have and are becoming aware of the health and cosmetic benefits of VCO and coconut water. The demand for VCO products is increasing steadily. The demand for coconut water has spiked in the last couple of years. However, reports indicate that supply is lagging behind demand. This presents a real opportunity for PNG producers. However overcoming the distance factor will be a challenge.

4.5 European market

Europe comprises of 48 countries and more than 731 million people. The wealth of these countries varies widely, but the poorest nations are well above the world average in per capita GDP and living standards. This makes Europe one of the most important retail regions worldwide and is home to some of the biggest retail companies in the world.

4.5.1 Market structure

Europeans view VCO as a speciality oil because (1) it is traded in much smaller volumes than conventional copra coconut oil, (2) it is not traded on the world market as a commodity unlike conventional coconut oil, (3) it does not go through a refining process, and (4) it can target niche organic markets when certified as organic. Generally, European importers view centrifugally-processed VCO to be destined for food manufacturers, because of the consistency in the product's quality and properties. On the other hand, VCO obtained by the expeller method (or low-pressure oil extraction), can be directed to the distributors for direct sales.

The marketing channel in Europe, as shown in Figure 8 below, is pretty much the same as in the other markets reviewed in this study. The first channel is where the VCO and other coconut products are manufactured and packaged in the producing country and exported to Europe via an importer or

[24] QYR Food Research Center, Oct 2016
[25] A number of research papers can be found in the following website: https://healthimpactnews.com/2016/virgin-coconut-oil-helps-reduce-diabetes-2/. Many of the recent research, as recent as 2016, have been undertaken by researchers in coconut producing countries like Malaysia and India.

broker to the retailer. This channel is more value adding to the producing country. The second channel is where bulk VCO and other raw coconut products are exported to Europe via an importer or broker to a manufacturer in Europe for further processing and packaging. Some of these manufacturers are retailers themselves. It is hard to work out the balance between the two in Europe but what is clear is that there are quite a number of manufacturers in Europe who are into processing and packaging of VCO products and coconut by products.

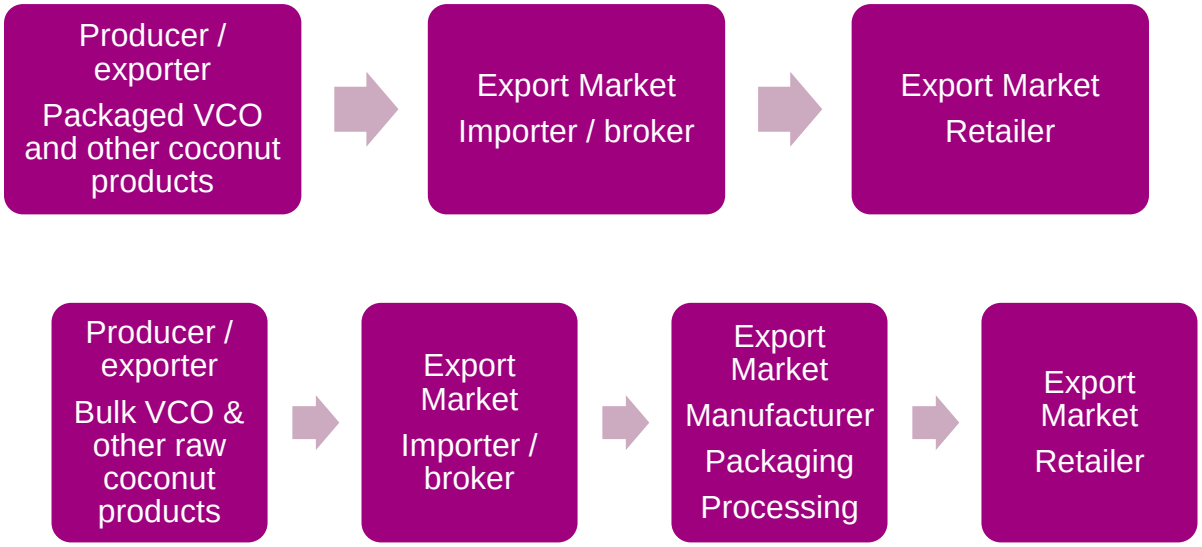

Figure 8: Marketing Channel

In Europe, the organic virgin coconut oil continues to be a niche market, but products have slowly found their way onto the shelves of the bigger supermarkets and home improvement stores, such as Tesco and Kingfisher in the UK. Organic certification is a must if PNG producers are to tap into the European organic niche market. Organic certification is governed by EU regulation for organic production under the EU/EFTA legislation. The main certification body in Europe is Ecocert. Europe generally recognises certification bodies from Australia, New Zealand, US and Japan.

According to CBI (the Centre for the Promotion of Imports from Developing Countries into Europe), fairtrade certification should be optional and producers from developing countries should assess (in consultation with the potential buyer) (1) if this label has sufficient demand in the target market and (2) whether the cost outlay will be beneficial for the product. As discussed elsewhere above, FLO is the main fair trade certification scheme in Europe.

Two types of markets for VCO can be identified in the European market: Consumer Market and the Food Industry. The former is the largest market segment, where packaged VCO (which can be used as cooking oil) in retail outlets, are accessed directly by the end consumer. The awareness about VCO being a treatment for diabetes is allowing consumers direct access to a potential diabetes treatment product without having to consult a doctor. As mentioned above, VCO was previously sold mainly through specialised retailers (e.g. health shops) in Europe, as slowly made its way into most mainstream supermarkets in Western Europe. In the Food industry, VCO is used as an ingredient to be further processed into food items such as confectionery products.

4.5.2 Imports and market size

Figure 9 below shows the volume of VCO sales and growth in Europe. Demand has been growing at 2 percent per annum between 2011 (27,741 MT) and 2015 (29,984 MT) and is projected to increase at the same rate for the next six years till 2021.

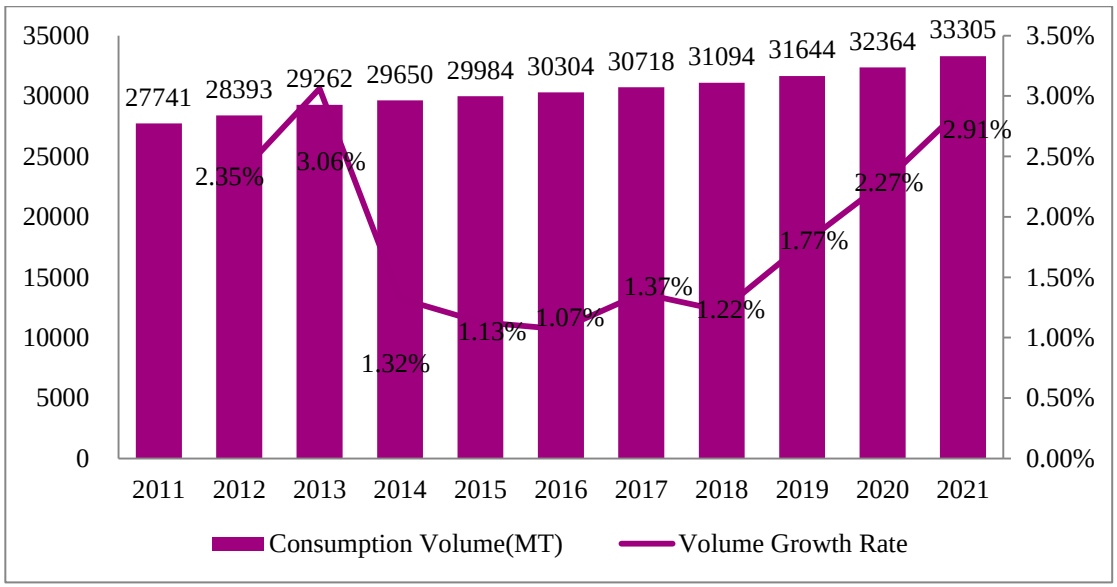

Figure 9: Europe Virgin Coconut Oil Sales and Growth Rate (2011-2016)[26]

The European market, which comprises 48 countries, is the largest market for VCO. However, on an individual country basis, the US would be the leading market. The size of the market has grown from US$188.97m in 2011 to US$209.29m in 2015, about 2.7 percent growth per annum and is projected to grow at about the same rate annually between 2016 ($213.04m) and 2021 ($240.93).

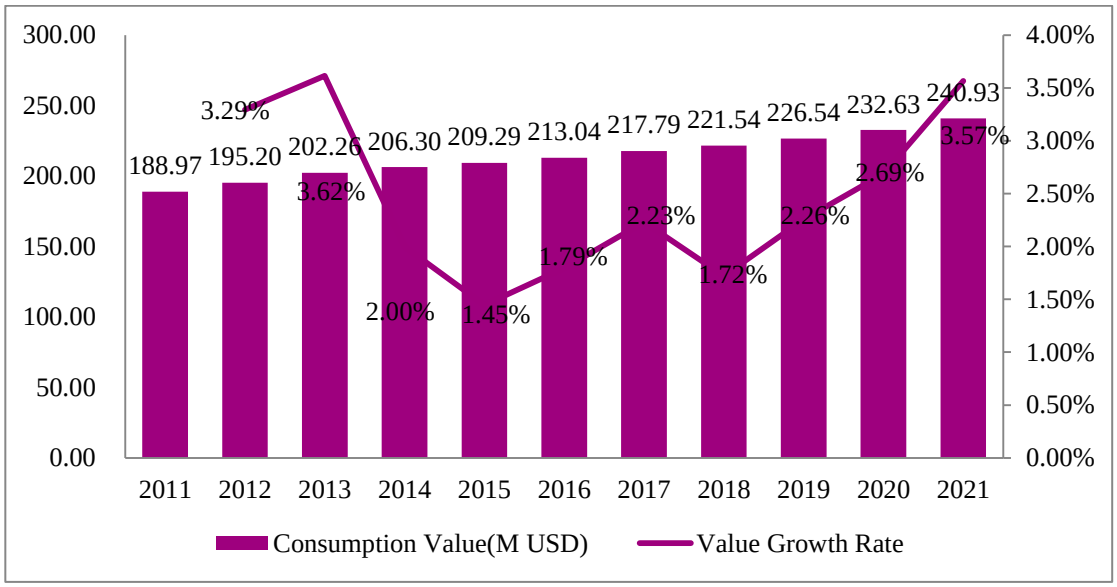

Figure 10: Europe Virgin Coconut Oil Revenue, Market Size and Growth Rate (2011-2021)[27]

4.5.3 Market trends

The European market for Virgin Coconut Oil (VCO) has grown significantly over the last years, driven by the growing attention that European consumers are paying to health and wellness[28]. This can also be attributed to the increasing awareness of European consumers about the health benefits of unrefined VCO based on findings of recent research. These research findings (most recently undertaken in India and Malaysia) have basically discredited the previously held view that saturated

[26]QYR Food Research Center, Oct 2016
[27]QYR Food Research Center, Oct 2016
[28] https://www.cbi.eu/sites/default/files/market_information/researches/product-factsheet-europe-virgin-coconut-oil-2015.pdf

fats caused heart disease. Initially available only through specialised shops, virgin coconut oil is becoming increasingly popular in mainstream supermarkets as well.

VCO has a very large proportion of lauric acid (around 50%), and is perceived to contribute in reducing cholesterol levels and fighting diabetes. Diabetes is increasing rapidly in Europe, according to the OECD, with 33 million aged 20-79 diagnosed as diabetic in 2010. This number is estimated to increase to 37 million in less than 20 years[29].

There is also an obsession with VCO termed as 'cold-pressed Virgin Coconut Oil', and the demand for it has increased during recent years. The term 'cold-pressed' is often associated with the production process that employs low pressure, low heat type of oil extraction method.

Buyers in Europe also want to learn more about their potential suppliers by visiting their websites. Producers from PNG can learn a lot from their competitors who are already in the export markets who have well-structured web sites.

Trade fairs such as BioFach and Food Ingredients Europe are held regularly in Europe. Such forums provide a perfect opportunity for producers in PNG to obtain up-to-date market developments and meet potential buyers face to face. Trade fair websites also contain very good company databases.

4.6 Japanese market

4.6.1 Market structure

Japan is considered to be the second largest retail market in the world with 127 million consumers who have an appetite for high quality and excellent service. With very high per capita incomes in the world, the Japanese people can easily afford western goods. The retail market accounts for 55% of the whole Asian retail market. Japan is food dependent and 61% of all foods consumed in Japan is imported (United Nations, 2008). Japan has the lowest self-sufficiency ratio (39%) amongst the developed countries. Consumption of imported meat and vegetable oils has been increasing since world war two[30]. The shift towards the consumption of imported food, particularly vegetable oil, bodes well for market opportunities for VCO.

Japan's population is also ageing with an Aged dependency ratio of 35.7%. More and more Japanese mothers are working. The aged and the mothers have no time to go to the grocery shops to do their shopping. Therefore there has been a heavy reliance on online shopping and shopping at convenience shops. However, supermarkets still feature prominently in the retail market[31].

The marketing channel in Japan is similar to the other markets reviewed in this study (refer to Figure 8 in Section 4.5.1). Online retail outlets are very popular with Japanese consumers. There are a number of manufacturers in Japan who process and package VCO products and other coconut products. It is really hard to tell how much of the VCO is been processed and packaged in Japan.

JAS (Japan Agriculture Standard) has approved as "Equivalent" the organic rules and standards of organic certifying bodies in other countries with the Organic JAS system. These countries also include the countries under review in this study (Australia, New Zealand, Europe and the US). That means imported organic products can carry the JAS logo even if such products are certified by an overseas certifying body.

An internet search of some Japanese online shops, convenience shops (coconut sweets and confectionaries) and supermarkets show that VCO products and other coconut products are now available in Japan.

4.6.2 Imports and market size

Figure 11 below shows the volume of VCO sales and growth in Japan. Between 2011 (838 MT) and 2015 (953 MT), the market grew by 3.43%. However, demand is projected to hold steady at 1.85% per annum for the next six years.

[29] Ibid
[30] http://www.japanretailnews.com/japans-retail-market.html
[31] http://www.euromonitor.com/grocery-retailers-in-japan/report

Despite its world ranking as one of the biggest retail markets in the world, Japan ranks the lowest in overall market size for VCO compared to the European market, the US, China and Australia. However, the size of the market has grown by 4.4% per annum between 2011 ($5.2m) and 2015 ($6.11m). Like the other markets under review in this study, the market is expected to continue to grow for the next six years at a rate of 2.7% per annum. It can be deduced from this data that VCO as a functional food is yet to gain a foothold amongst other vegetable oils that the Japanese consumer has been so used to. Given the popularity for VCO in Japan in recent times, there is a real opportunity for producers from PNG to seriously consider this market.

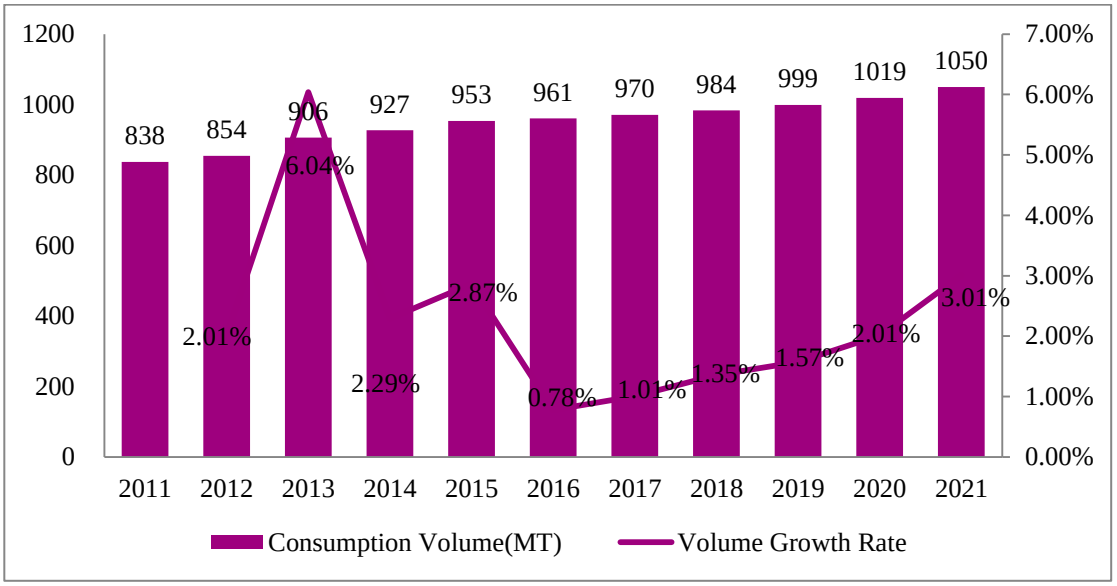

Figure 11: Japan Virgin Coconut Oil Sales and Growth Rate (2011-2021)

Source: QYR Food Research Center, Oct 2016

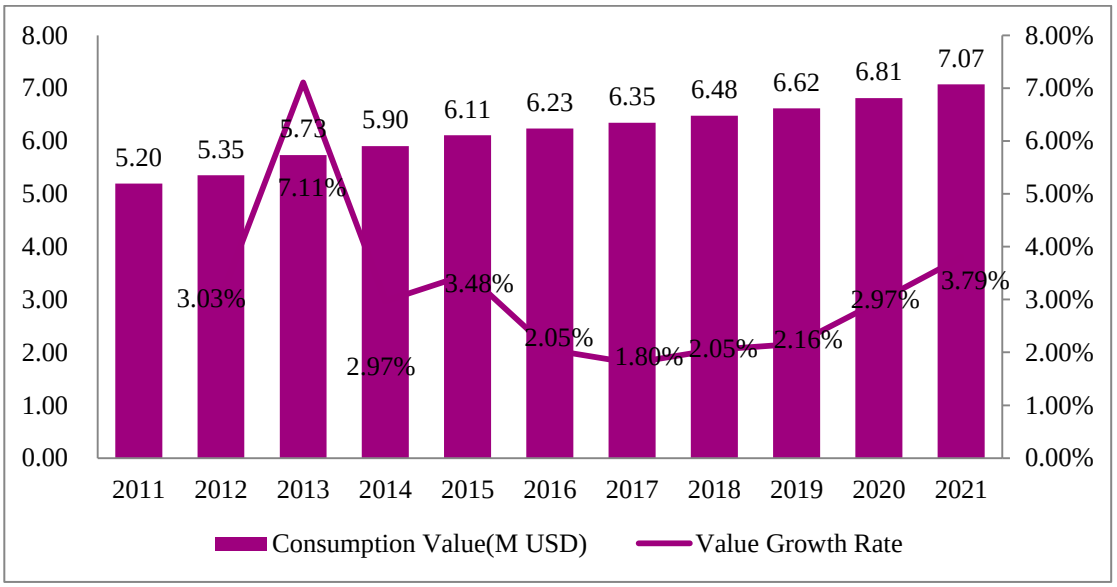

Figure 12: Japan Virgin Coconut Oil Revenue (Market Size) and Growth Rate (2011-2021)[32]

4.6.3 Market trends

The demand for healthy or functional foods in Japan has been increasing since the mid-1990s, particularly among those aged 50 and above and adult women. Functional foods in Japan are

[32] QYR Food Research Center, Oct 2016

categorised into two groups: “Foods for Specific Health Use,” or FOSHU and health enhanced food[33]. VCO is growing in popularity as functional food oil and the public awareness of it is increasing in Japan.

Bulk VCO imports are of particular interest to food manufacturers in Japan.

Online shopping is huge in Japan. Many Japanese, particularly the aged and working mothers, have increasingly become aware of the potential uses of VCO in addition to its direct consumption and for cosmetics. In some cases particular medical/health benefits of VCO are being claimed by retailers, e.g. to improve and prevent Alzheimer's disease[34].

In terms of new business wanting to enter the Japanese market, Japan Retail News (JRN) recommends that they should form partnerships with local Japanese ground support experts and work with them. JRN is one such company that provides such support services. They warn that there are enormous differences between Western and Japanese business culture and customs for example and other culture for that matter. They cite many cases of major foreign companies who failed and had to pull out of Japan because they failed to pay attention to Japanese business culture and custom[35].

4.7 Market entry points

There is a need to consider the timing and priority of the market entry opportunities set out in sections 3 and 4 to this point.

In the domestic market we have discussed the production of high-value coconut products for the domestic market and for the tourism and diaspora markets. Thus allows a lower risk market entry as the quality, packaging and labelling of products develop.

These market approaches also offer a relatively accessible market that will accept smaller volumes and potentially pay higher prices than the large scale retail markets discussed in Section 4. In the international markets, we note well established large-scale quality assured producers in Vietnam, the Philippines and Malaysia for example tending to dominate the closest import opportunities in Australia and New Zealand. Figure 13 shows nominal market entry points as the high-value coconut industry grows in Papua New Guinea.

[33] http://www.japanretailnews.com/japans-retail-market.html
[34] http://virgincoconutoil.asia/trend-penggunaan-virgin-coconut-oil-di-jepang/
[35] http://www.japanretailnews.com/japans-retail-market.html

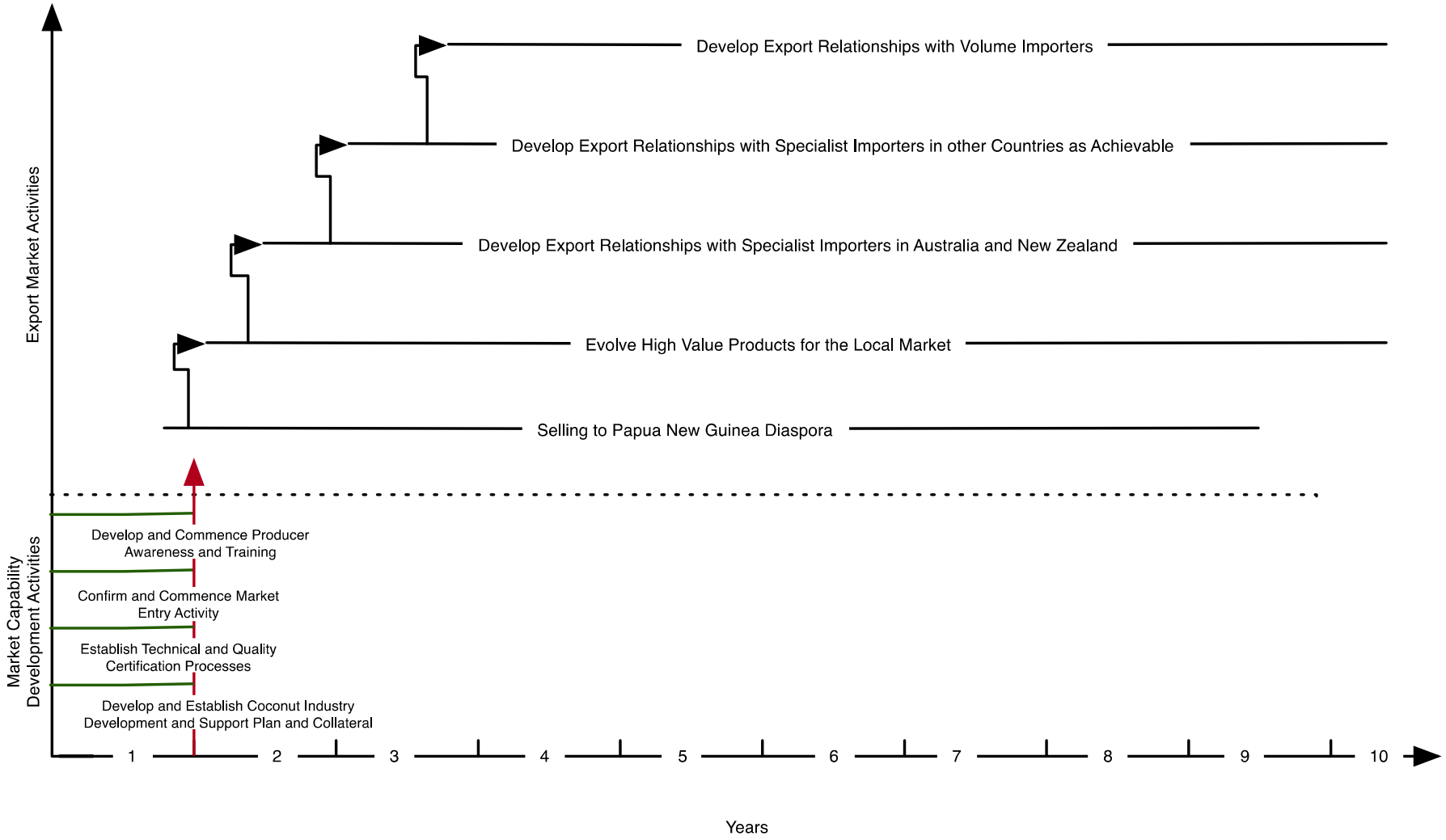

Figure 13: Market Entry Points

In this context, we recommend initial market entry to the specialist retail markets where the low volume and differentiated (unusual) Papua New Guinea product will be of interest to customers in these outlets. Later, with established quality products accepted by international markets, other options for export will present – moving down to larger volumes and lower margins and/or extending the high-value speciality market approach.

While setting an activity plan for export market development is outside the scope of this report, we make the following comments and suggestions as to establishing an export market framework and market entry points based on the information provided in this report:

- To develop quality capable exporters in Papua New Guinea, we assume that KIK will set up an export development program of work that will assist producers to understand and develop competitive export grade coconut products. While in general this is not the case given a comparison with the export capabilities of the Philippines, Indonesian and Malaysian markets, we suggest the four steps shown in the first 12 months of development of the export market shown in figure 13 will be necessary:
    - Develop and Establish a Coconut Industry Development and Support Plan and Collateral. We note the excellent web sites of the United Coconut Associations of the Philippines (ucap.org.ph) and the peak development body in that country, the Philippine coconut Authority (pca.da.gov.ph).
    - Establish technical and quality certification processes as discussed in Sections 3.1 to 3.3 of this document.
    - Confirm and commence market entry activity plan. We suggest this can commence before the two bullet points immediately above are completed, because this is already happening for some high-value products being exported including to Papua New Guineans already living overseas. This activity can be assessed and augmented relatively easily, and encouraged.
    - Develop and commence produce awareness and training. We have suggested an economic model for the growth of VCO production in Section 3.3, and this may be the fastest approach to the development of export grade high-value coconut product.
- Selling to the Papua New Guinea diaspora, most likely in Australia and New Zealand, the recommended export markets for high-value coconut products. The benefit is that Papua New Guineans living overseas are likely to exhibit loyalty to these products, provide useful feedback on what changes are needed, and to be advocates in their community for the products.
- Selling an increasingly competitive product in Papua New Guinea to existing customers and against imported high-value products. This includes to visitors in airports and hotels, and to cruise ships stopping in Papua New Guinea. Learning to succeed in this market is relatively low risk and low cost while quality systems are implemented and standards rise.
- Develop export relationships with low volume importers in Australia and New Zealand who seek product differentiation from countries other than the large exporters. Consider other countries where these coconut-differentiated products may be valued. We have discussed the market opportunities in Japan, China, the US and European markets.
- When export volumes are high enough, economies of scale may permit entry to the high quality volume markets in supermarkets in Australia and New Zealand and beyond.

5.0 Recommendations

The success of private enterprises relies upon their motive to make profits. Any initiatives pursued by PHAMA and KIK must be on basis ventures are seeking commercial profitability.

Ultimately the success of each coconut organisation will be dependent on the management and internal efforts of the organisation to embrace change and seek more profitable business activities.

In our discussions with importers of coconut products in Australia and New Zealand, their perceptions of PNG as a source of high-value products such as coconut water and VCO ranged from neutral to lacking knowledge, to somewhat negative. With many countries[36] entering the international market for these products, PNG faces competitive challenges to access the international market.

In Table 39 we provide detailed recommendations, with reference to the relevant sections of the report, that describe what is needed for the Papua New Guinea coconut industry to enter the competitive high-value coconut international market.

An outcomes workshop was held on the 26th October 2016 in Port Moresby with the SMEs and other key stakeholders based on the second draft of this report. One of the key outcomes of the workshop was to group the recommendations in the second draft into priority activities as shown in Table 39.

We believe KIK will be the peak body organisation that will develop the business case and activity plan to drive the necessary change in the coconut industry in Papua New Guinea.

Table 39: Recommendations

Recommendations – Trade Logistics	Discussion and Recommendations
1 Sections 1-2 describe the current production and export capability in Papua New Guinea. Section 4 describes the major export markets for Papua New Guinea	There is substantial latent production capacity of coconut products in Papua New Guinea. Global markets for high-value coconut products are growing and are well served by countries other than Papua New Guinea, such as Indonesia, Thailand and Vietnam. These countries have significant scale, documented quality systems and dominate the high volume export markets. *In broad terms the low volume higher margin specialist retail markets in Australia and New Zealand are recommended as the first export market opportunities for high-value coconut products.*
2. Growth markets refer to Section 4	All developed countries are demonstrating high demand for high-value coconut products. The report covers demand in 5 countries (Australia, New Zealand, Japan, China and the US) and the European Union. A focus on starting to win more export revenues with the Australian and New Zealand markets is recommended because they are close geographically, there are long term trading, government and cultural links between these countries and Papua New Guinea. First economically feasible market approach is likely to be the specialty retail markets such as health food stores where the Papua New Guinea differentiator and higher prices may be justified. Given the relatively small production capability in Papua New Guinea compared to Sri Lanka, Vietnam, the Philippines and Malaysia for example, it is unlikely that Papua New Guinea can compete on price in the mass (supermarket) level for example. The relative lack of production standards and certification would make this larger market more difficult to penetrate, while individual producers in Papua New Guinea can demonstrate success more easily in the specialist retail industry discussed above. The report notes initial skepticism of existing coconut product importers

[36] Indonesia, Sri Lanka, Thailand, Vietnam, India

	in Australia for Papua New Guinea production of high-value products. *It is recommended that the coconut industry focus on the export of high-value products to the higher end retail markets in Australia and New Zealand in the first instance and build capacity and quality in this way to move down to the larger volume lower margin as market capacity and acceptance develops.*
3 Linking tourism/market/networks/cruise ships. Refer to Section 2.2 for the domestic market discussion.	The domestic market includes competing against imported coconut products and improving product quality, packaging and labelling in this relatively benign local market. This market includes a small but important segment of the tourist market, online sales and cruise ships. Section 2.2.6 refers to this market approach. *It is recommended that the domestic market development plan include sales development in hotels, tourist ship ports and to assist producers target online export markets via the Papua New Guinea diaspora.*
4 Market Entry Points. Refer to Section 4.7 Market Entry Points	The report suggests a series of market entry points that match evolving product quality and production capacity – see Figure 13.

Recommendations – Export Markets	**Discussion and Recommendations**
In Australia and New Zealand we interviewed a number of coconut importers who can be contacted for further information on their interest and conditions regarding the importation of PNG coconut products.	We have provided lists of coconut product producers in PNG in Table 1. Appendix B contains a list of coconut organisations and trade contact details that may be useful for further research.
Section 4 describes the most immediate and largest export market opportunities for Papua New Guinea. Appendix B sets out a trade list of coconut companies in New Zealand.	There are already high volume quality assured producers of high-value coconut products in the Asia Pacific region – the Philippines, Malaysia, Sri Lanka and Vietnam. These countries provide most of the high-value coconut products to the high volume supermarket outlets in Australia and New Zealand. We have recommended the development of low risk export like sales to the domestic market in PNG, to tourists in PNG and to the PNG diaspora while preparing to sell into low volume importers in Australia and New Zealand. We have interviewed a range of current importers in Australia and New Zealand and the general view of PNG is that the country may not be equipped yet to be a viable exporter of high quality, high-value coconut products. We recommend that KIK speak with these importers to hear first-hand their views. *We recommend that the adoption of internationally accepted standards and certification is necessary to compete with current exporters to any developed country, Australia and New Zealand included. We have provided the contact details for a number of current importers in Australia and New Zealand who are likely to be interested in PNG coconut product given competitive pricing and quality certification.*

Recommendation – Standards	**Discussion and Recommendations**
Establish performance measures for the industry. Refer to Section 3.1 and 3.2 for Technical Certification recommendation. In brief, the HACCP certification being promoted by KIK to	In other coconut producing countries standards based production is the norm and has led to importers expecting internationally recognised standards compliance. The standards compliance requirements are HACCP and either ACO or NASSA. Sections 3.1 and 3.2 apply.

ensure VCO is genuine. We have recommended that ACO certification be a requirement for producers of organic products. We provide costs for this certification in Table 33.The alternative is NASAA certification and this cost is in Table 34.	*We recommend that all growers intending to export from PNG should comply with internationally recognised standards.*

Recommendation – Certification	Discussion and Recommendations
We have recommended that ACO certification be a requirement for producers of organic products. We provide costs for this certification in Table 14. The alternative is NASAA certification and this cost is in table 15.	*We have recommended that HACCP certification is essential for all high-value coconut exporters and have also recommended that ACO or NASSA certification be a requirement for producers of organic products. We provide costs for certification in Tables 14 and 15.*

Recommendation – Capacity Building	Discussion and Recommendations
Many producers feel they need capacity building assistance and we understand this takes time to develop new skills and achieve the material benefits that result from change.	We suggest a mentoring program for coconut industry managers that covers: 1. The matters of standards, certification (Section 3), 2. Investment in new equipment such as VCO production (Section 3), 3. Introduction to export markets (Section 4, especially 4.1 and 4.2) 4. Competitive positioning against foreign products in the PNG market, selling to PNG visitors and to the PNG diaspora (Sections 2.2.6 and 2.3) 5. Improving packaging and labelling (Section 2) We expect that for each of these areas, KIK would develop a business case with an assessed return on investment related to export revenues in the long term, and capability assessment in the short term. During the SME survey, an established SME (Amruqa), had suggested that it can be engaged by KIK to: a) Assist in implementing the 2016 - 2025 strategic plan b) Create a working example at Vunakanau to provide training to SMEs such as the lab and QC tests and record systems. Much needed in drawing up a HACCP Plan! Hazard Analysis. d) Assist in sourcing and selecting suitable technology and equipment to meet a given requirement of an SME based on production input and output to market. This would include providing training on the setup, operation and maintenance of the machines. Amruqa could also be engaged to assist with the set up and implementation of regional KIK centers that could be built into training centers.

We also suggest consideration for developing shared processing facilities, to assist smaller producers being able to access overseas markets. This allows economies of scale and would be the subject of an economic evaluation of costs (shared) and revenue growth to identify a location and viable volumes

needed to operate effectively. We expect that a well-prepared business case could attract international aid assistance. Example of this shared facility concept include:

- Developing shared quality testing facilities
- Providing assistance to access lower cost packaging and labelling that is of international standard
- Providing access to commercial loans on reasonable terms to enable expansion. The economic model provided in this report can be used to assist loan criteria and conditions imposed on producers.
- Develop a product guide, initially for VCO that assists growers to understand the production process for quality product, standards compliance, cost assessment, packaging and marketing.
- Develop an industry coconut web site operated by KIK. This would serve the following purposes:
    - Provide all relevant industry metrics and plan
    - Describe international expectations regarding processing, quality, packaging
    - List all relevant quality standards for PNG, and how producers can undertake quality certification
    - Include the product guide described above
    - List all coconut growers and product producers that meet minimum KIK standards, to enable importers to find and commence discussions with these organisations.

Most of the above list are matters that VCO producers can do for themselves. However, we believe KIK can provide assistance in several forms.

On the 27th October 2016, following the Outcomes Workshop, the High-valued Coconut Products Industry Working Group (HVCP IWG) met to reflect on the recommendations of the Coconut Market Study Draft Report and subsequently made decisions for recommendations to be collated under 5 Headings which are reflected above in Table 39. Table 40 shows the activities that have been prioritised by the HVCP IWG to be completed by May 2017.

Table 40: HVCP IWG Prioritisation of Activities[37]

1. Development of a marketing plan for HVCP SME producers

- Based on findings of the market study, KIK to work with interested SME"s to develop a plan for improved domestic sales and export. Scope to cover potential marketing tools for SMEs & KIK, awareness programmes on benefits of HVCP's, branding and distribution channels.
- Develop Supplier and Buyer Guide (direct responsibility of the KIK Marketing Unit) from the contacts in the market study.

2. Standards and quality

National standards

- KIK to progress adoption of national standards for selected coconut products e.g. VCO, cooking oils, soaps based on recognized APCC standards. PHAMA to consider support to assist in associated consultative processes and awareness activities.

Laboratory quality testing capacity

- KIK to progress updating capacity to conduct appropriate testing to support implementation of quality standards.

Hazard Analysis Critical Control Points (HACCP)

- KIK to progress initial HACCP training and gap assessments with industry.

[37] Provided by PHAMA and KIK.

- PHAMA to consider potential support for HACCP accreditation processes by selected SMEs, and for this to be a capacity building exercise for KIK and other agencies e.g. NISIT.

Organic certification

- PHAMA and KIK to clarify interest amongst export ready SMEs to obtain organic certification to meet market/customer requirements. PHAMA to consider support for organic certification processes for SMEs.

3. Market access and commercial requirements

- KIK and PHAMA to assist interested exporters to clarify and confirm relevant import requirements (food, composition, labelling) and commercial standards at nominated destination markets.

4. Trade samples & trade visits

- To link producers with potential buyers and to confirm compliance with market standards PHAMA will support facilitation of trade samples, and potential trade visits to identify and establish buyer relationships.

5. Industry capacity building

As part of the broader marketing initiative and quality improvements KIK, PHAMA and other potential partners are to consider support for capacity building of the industry including:

- Development of online marketing (websites and E-commerce platforms) presence and tools.
- Business mentoring support (Business planning, financial literacy, trade contracts negotiation, book keeping, entrepreneurship skills)
- Appropriate processing technology training improvements.

5.1 Final remarks

The coconut market production in Papua New Guinea has declined over 30 plus years because of volatile market prices, changes to product requirements, a lack of investment and market cohesion, and limited quality standards to achieve product consistency.

Demand for high-value coconut products is increasing globally and this presents an opportunity for Papua New Guinea to consider how to address export growth potential, especially with Australia and New Zealand in the first instance where language, history and government support are present. The market demand for coconut products in these countries significantly exceeds the current production output from PNG, and so there is little risk of market saturation.

We have modelled the economics of SME investment in VCO production and believe that this is a likely focus for KIK and PHAMA to influence export growth.

There are a range of supporting activities that need to be in place to support industry growth, from defining, promoting and controlling the VCO and other high-value coconut products, to quality control processes and standards certification and quality packaging.

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Appendix A

VCO product definition

Appendix A VCO product definition

There is no widely accepted definition of Virgin Coconut Oil. However, the APCC Quality Standard for Virgin Coconut Oil (Amended 2009)[38] defines VCO as:

Virgin coconut oil (VCO) is obtained from fresh and mature kernel (12 months old from pollination) of the coconut (Cocos nucifera L.) by mechanical or natural means with or without the application of heat, which does not lead to alteration of the nature of the oil. VCO has not undergone chemical refining, bleaching or deodorizing. It can be consumed in its natural state without the need for further processing. Virgin coconut oil consists mainly of medium chain tryglycerides, which are resistant to peroxidation. The fatty acids in virgin coconut oil are distinct from animal fats that contain mainly of long chain-saturated fatty acids. Virgin coconut oil is colourless, free of sediment with natural fresh coconut scent. It is free from rancid odour or taste.

Table A1.1: Essential Composition and Quality Factors of Virgin Coconut Oil

Parameter	Specification
Moisture (%)	Max 0.1
Volatile Matters at 120°C (%)	Max 0.2
Free Fatty Acid (%)	Max 0.2
Peroxide Value meq/kg	Max 3
Relative density	0.915 0.920
Refractive index at 40°C	1.4480 – 1.4492
Insoluble impurities per cent by mass	Max 0.05
Saponification Value (Mg KOH/g oil)	250 – 260min
Iodine Value (Wijs)	4.1 – 11
Unsaponifiable matter % by mass, max	0.2 – 0.5
Specific gravity at 30 deg./30°C	0.915 – 0.9200.2
Polenske value, min	13
Parameter	**Specification**
Total plate Count	<0.5
Color	Water clear
Odor and Taste	Natural fresh coconut scent, free from sediment, free from rancid odor and taste

In addition, the standard specifies the following:

Hygiene

It is recommended that the product covered by the provisions of this standard shall be in accordance with the appropriate sections of the General Principles of Food Hygiene recommended by the CODEX Alimentarius Commission (CAC/RCP 1-1969, Rev. 4-2003).

Labelling and Packaging

The name of the food on the label shall be “Virgin Coconut Oil”. The provisions of the General Standard for the labelling of Pre-packaged Foods (CODEX STAN 1 – 1985, Rev. 6 - 2008) shall apply.

Standards Origin and Relationships

[38] APCC Quality Standard for Virgin Coconut Oil (Amended August 2009): retrieved from http://www.apccsec.org/apccsec/admin/files/11VCO%20Standard%20Flyer.pdf.

Thailand and the Philippines were the first to set quality standards for VCO in 2004 (TCS (Thailand Coconut Community Standard) 670-2004 and (PNS: Philippine National Standard / BAFPS 22:2207:ICS 67.200.10) respectively. The Philippine standard was revised in 2007 that is why it is dated as 2007. This was followed by the Malaysian standard in 2007(MS (Malaysian Standard) 2043:2007) and the Indonesian standard in 2008 (SNI (Indonesia National Standard) 7381:2008 PNS). The APCC Standards, dated 2009, was based on the Philippine, Thailand, Malaysia and Indonesia standards. The APCC standard falls short of specifying:

(1) Maximum period from the time of collecting the whole nut to extracting the oil, and
(2) the processes involved in producing VCO.

Source

The source of the VCO is the whole dried coconut. There are different varieties of coconuts, some are short, some are tall, some are more cold hardy and some are more resistant to drought but the APCC quality standard does not differentiate.

Processing

The freshness of the coconut is important. The extraction of the oil must happen within 24 to 48 hours after the coconuts are either plucked from the tree or collected from the bottom of the coconut tree[39]. The extraction method is the key.

There are basically two ways in which VCO can be processed.

(1) VCO derived from expeller-pressing the oil from dried grated or shredded coconut.
In this method, the grated or shredded coconut meat is dried[40] first to reduce the moisture content and then later the oil is pressed out of the coconut. The oil should be extracted within 24 hours. Several production processes are employed in PNG. They include: DME (Direct Micro Expeller), Ram Press, Bridge Press, the Squeezer and the Screw Press. The screw press is common in the copra industry.

(2) The wet mill process.
In this method, the oil is extracted from the freshly grated or shredded coconut without drying it first. Coconut milk is first extracted through a pressing system (mentioned above) and then the oil is further separated from the water. This will generally take more than 24 hours and up to 48 hours. Oil extracted using the mechanical Centrifuge method takes place within 24 hours. Methods employed in PNG include the fermentation method and mechanical centrifuge. Other methods that can be employed include the traditional cottage / kitchen type method of boiling the coconut milk to separate the oil from the water, refrigeration and enzymes.

VCO produced from the wet mill process is also referred to as “Cold Pressed VCO” or Absolute No Heat (ANH) VCO[41]. Of all the methods employed in the wet mill process, the mechanical centrifuge method generates the most heat.

The term ‘Extra’ VCO is not based on quality or characteristics different from other VCO. It is an arbitrary term employed by marketers.

The Philippines standards for VCO are widely quoted in the literature and does specify the process in its standards. We recommend adopting a VCO standard that matches or exceeds those of our closest competitors – the Philippines, Thailand, Malaysia.

We suggest extending the APCC definition of VCO by including the time dimension of extracting the oil, the production process and some qualifying statements in relation to labelling claims such as “cold pressed”, “Extra VCO” and “ANH VCO”.

[39] Personal communication with experts in the industry. They included Richard Etherington (Kokonut Pacific), Stacey King (Nature Pacific) and Andreas Lombardozzi (African Pacific). See also Satheesh and Prasad (2014). In PNG all the dry mature coconuts are collected from the bottom of the trees, which are mostly the tall variety. That is why coconuts are checked at the farm gate and sorted. Only the good ones are accepted.
[40] The grated or shredded coconut is either sun dried or dried over stainless steel panel over fire fueled by coconut shell and husk.
[41] However, some heat is also generated from the pressing process so therefore the term ‘Cold Pressed’ or ANH VCO is not entirely correct.

The modified APCC definition that might be adopted by PNG:

Virgin coconut oil (VCO) is obtained from fresh and mature kernel (12 months old from pollination) of the coconut (Cocos nucifera L.) by mechanical or natural means with or without the application of heat, which does not lead to alteration of the nature of the oil. The VCO must be extracted within 24 to 48 hours from the time it is plucked from the tree or collected from the bottom of the tree, and depending on the method of extraction.

VCO has not undergone chemical refining, bleaching or deodorizing. No additives are permitted. It can be consumed in its natural state without the need for further processing. Virgin coconut oil consists mainly of medium chain tryglycerides, which are resistant to peroxidation. The fatty acids in virgin coconut oil are distinct from animal fats, which contain mainly of long chain-saturated fatty acids. Virgin coconut oil is colorless, free of sediment with natural fresh coconut scent. It is free from rancid odor or taste.

Two types of oil extraction methods are employed: (1) The expeller pressed oil from dried grated or shredded coconut meat and (2) the wet mill process. The production process in the former method include the DME (Direct Micro Expeller), Ram Press, Bridge Press, the Squeezer and the Screw Press. For the latter, the production process includes boiling the coconut milk to separate the oil from the water, the Fermentation Method, Refrigeration, Enzymes and mechanical Centrifuge. For the first process, the oil extraction takes place within 24 hours.

For the second process, the extraction of oil will take place within 24 hours to 48 hours. VCO cannot be labelled as "cold pressed", "Extra VCO" or "ANH VCO".

Appendix B

Trade contact list

Appendix B Trade contact list

ORGANISATION	CONTACT PERSON	WEB SITE / SKYPE	PHONE (LANDLINE, CELL, FAX)	EMAIL
Nature Pacific Pty Ltd Cnr Casua & Rina Court 4 Rina Ct Vasity Lakes, Qld 4227 Australia	Stacey King	http://www.naturepacific.com/ http://www.banabanvoice.com Skype: Stacey-king	Tel: +61 7 55759005 Mobile:+61 414698305	stacey@naturepacific.com
Kokonut Pacific **Office & Warehouse** 2/34 Silva Av Queanbeyan NSW 2620 Australia **Postal Address** PO Box 4088 Hawker ACT 2614 Australia	Richard Etherington	http://www.kokonutpacific.com.au/ Skype: retho1965	Tel: +61 2 62970268 Fax:+61 2 62970270	Richard@kokonutpacific.com.au
African Pacific Pty Ltd PO Box 377, Terrey Hills NSW 2084	Andreas Bruno Lombardozzi	http://www.africanpacific.com http://www.nuicoconut.com Skype: drcoconut	Tel: +61 2 99863444 Mobile: +61 412611877 Fax:+61 2 99861911	andreas@africanpacific.com
Pacific Growers Export Partnership	Andreas Bruno Lombardozzi	http://pacificgrowers.net/ http://www.nuicoconut.com Skype: drcoconut	Tel: +61 2 99863444 Mobile: +61 412611877 Fax:+61 2 99861911	andreas@africanpacific.com
NASAA Certified Organic Unit 7, 3 Mount Barker Road,	Lee Mastus	www.nasaa.com.au	Tel:+61 8 83708455	Lee.Mastus@nasaa.com.au

ORGANISATION	CONTACT PERSON	WEB SITE / SKYPE	PHONE (LANDLINE, CELL, FAX)	EMAIL
Stirling SA 5152 PO Box 768, Stirling SA 5152, Australia	Danrui Wu			Danrui.wu@nasaa.com.au
Australian Certified Organic 18 Eton St Nundah Queensland 4012 Australia	Kellie Lewis	www.aco.net.au facebook.com/australian.certified www.austorganic.com facebook.com/AustOrganicLtd	Tel: +61 7 33505716	info@aco.net.au
FairTrade Australia New Zealand	Hannah Andersen	http://fairtrade.com.au/ http://fairtrade.org.nz/	Tel: +61 3 96022225 Mobile: +61 432547600 Tel: +64 9 9204950	info@fairtrade.com.au info@fairtrade.org.nz hannah@fairtrade.com.au
Cathedral Cove Naturals	Go to website	Eatwellbewell.co.nz	Go to webstie	Go to website
Pacific Island Trade & Invest Level 11, 171 Clarence Street Sydney NSW 2000 Australia	Jeremy Grennel	http://www.pacifictradeinvest.com	Tel: +61 2 9290 2133 M: (61) 452272720 Fax: +61 2 9299 2151	jeremy.grennell@pacifictradeinvest.com
go4WorldBusiness	Go to website	http://www.go4worldbusiness.com/ A website were buyers and sellers of VCO advertise	Go to website	Go to website
FairMatch Support Grote Koppel 8 3813 AA Amersfoort	Herman uit de Bosch (For access into European market)	www.fairmatchsupport.nl Skype: hudbosch	Tel: +31 334612525 M: +31 6 13232794	herman@fairmatchsupport.nl

ORGANISATION	CONTACT PERSON	WEB SITE / SKYPE	PHONE (LANDLINE, CELL, FAX)	EMAIL
The Netherlands				
Cathedral Cove Naturals	Go to website	Eatwellbewell.co.nz	Go to website	Go to website
Simply	Go to website	Simplyoil.co.nz	Go to webstie	Go to website
Blue Coconut	Go to website	Bluecoconut.co.nz	Go to website	Go to website
Chantal Organic Wholesalers	Go to website	Chantalorganics.co.nz	Go to website	Go to website
Trade Aid	Go to website	Tradeaid.org.nz	Go to website	Go to website
Cathedral Cove Naturals	Go to website	Eatwellbewell.co.nz	Go to website	Go to website

Appendix C

ACO organic certification process

Appendix C ACO organic certification process

Certification Process for Primary Production (retrieved from http://aco.net.au/certification-process/)

- Application kit is requested / completed and returned to ACO with application payment and supporting documents
- Application and documents are reviewed for completeness and compliance. Missing information is requested after this review
- After successful document review, an onsite audit is organised to validate all declared information
- Audit is executed and soil test samples are taken (invoiced to operator)
- Audit report is submitted by Inspector to ACO for review.
- ACO reviews report to determine whether compliance is met. If operator can demonstrate the land has been handled in compliance for at least 12 months, the property will enter In-Conversion status and remain there until over length of compliance reaches 36 months at which point the property will be upgraded to Organic status.
- If successful, certificate is issued. If unsuccessful, official notice of items that are to be addressed is issued. Once non-conformances are addressed, certification can be finalised.

Certification documents can be obtained at aco.net.au.

Appendix D

NASAA Organic certification

Appendix D NASAA Organic certification

International Operations (retrieved from https://www.nasaacertifiedorganic.com.au/certprograms/steps-to-certification/international-operations.html)

NASAA certifies a growing number of organic operations outside of Australia, including production and processing operations (comprising over 12,500 small growers) in Indonesia, Italy, Malaysia, Singapore, Nepal, Papua New Guinea, Solomon Islands, Sri Lanka, Tonga, Samoa and the United States.

NASAA's international accreditation ensures the acceptance of products into various markets throughout the World - including the EU and US - with certification services provided outside Australia for:

* Individual Operations
* Grower Collectives
* Certified Product/s entering Australia (Re-certification).

While the process of certification is similar to that of Australian operators, there are some key differences, as operators outside Australia do not fall under the accreditation provisions of the Australian Department of Agriculture and Water Resources (DAWR). We encourage our international readers to view the National Steps to Certification as a general guide in conjunction with the specific information provided on this page.

Certification of an Individual Operation

NASAA provides offshore certification services across the supply chain - from primary producers, to manufacturers, exporters and retailers. The process of certification is consistent with Australian-operator requirements excepting primary production.

In Australia, all primary producers entering organics are required to undertake a preliminary year in pre-certification, at the commencement of which conventional farming methods and inputs are phased out and converted to organic practices; and during which product is unable to be sold with reference to 'organic'.

Operations based outside Australia, however, can move into 'conversion to organic' following inspection and review, provided that evidence is given to substantiate that at least twelve months have elapsed since the point of last application of a prohibited input.

Operators must demonstrate the management of operations in accordance with requirements set out in the *pdf* NASAA Organic Standard (721 KB), in particular ensuring that a documented Organic Management Plan is in place.

Taking into account past land use and practices employed, the 'in-conversion' period may be further shortened where operators can demonstrate compliance with the requisite Standards over several years. Full certification may be granted in some cases where compliance has been demonstrated over a significant period - at least three years.

As NASAA services are primarily delivered in the English language, it is essential that applicants are conversant in English (or have access to translation services) to ensure that certification requirements and procedures are fully understood. NASAA offers assistance through providing a concise outline of Standards requirements for effective language translation.

Certification of Grower Collectives

Many overseas operations, particularly within developing nations, run grower group schemes, which typically comprise a parent marketing or development company working with village-based growers.

Central to the certification process is the examination of the management systems of the parent company. The NASAA inspection process is reliant on the existence and maintenance of an auditable, central Internal Control System (ICS), where individual contracts with all registered growers are recorded and managed by the parent body in accordance with the requirements of the *pdf* NASAA Organic Standard (721 KB). Forming part of this system, documented records of annual inspections conducted by the parent company are required for all registered growers.

The process of certification includes an examination of the central ICS and inspection of a proportion of these registered growers through a physical site visit, contracted to a number of international organic inspectors possessing experience in both the country's crops and cultural techniques. Site inspections will be conducted in all cases where individual landholdings are in excess of 5 ha in total farm size.

The period in which full certification may be granted will take into account and recognise that farming practices and methodologies may have been operating in accordance with the *pdf* NASAA Organic Standard (721 KB), particularly where modern, conventional farming methodologies have not been extensively employed.

It is important to note that NASAA must certify all elements of the supply chain from production to processing, transport, handling and export.

Certification documents can be obtained from https://www.nasaacertifiedorganic.com.au/certprograms/steps-to-certification/international-operations.html