

THE COCONUT INDUSTRY IN PAPUA NEW GUINEA: POLICIES AND PROGRAMS

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I. Introduction

The Government of Papua New Guinea recognizes the significant role coconut industry has played in the development of coastal and maritime areas in PNG before and after Independence. However, the coconut industry is at a crossroad as copra production becomes financially unprofitable on a cyclic pattern for plantations and smallholders. Hence, alternative approaches of reviving the industry in PNG have been under consideration for some time by all relevant stakeholders.

Total Area under Coconuts

Coconut palms accounted for 248,000 hectares of land in PNG in 1972/1974 (Wheeler et al. 1973). Kokonas Industri Koporesen (KIK) has estimated that the actual area under coconut is currently at 221,000 hectares. This is based on the following factors: 15% of the land under coconuts was lost to oil palm in 1980s and older coconuts in abandoned plantations and smallholder blocks have been lost to pests/diseases and fire.

Percentage of the coconut area as against the total agricultural land of the country

The total land area of PNG is 459,854 km² or 45,985,400 hectares and 117,858 km² or 11,785,800 hectares (25.6%) is used for agriculture while 22,465 km² or 2,246,500 hectares (4.9%) is land unsuitable for agriculture (Allen and Bourke, 2009). A total of 319,531 km² or 31,953,100 hectares (69.5%) is classified as unused land under natural forest cover in PNG. KIK has estimated that coconuts currently occupy 2,200 km² or

220,000 hectares (1.87%) of the land used for agriculture in PNG.

Number of people employed or dependent on the coconut industry

A total of 309,417 households were reported to be engaged in coconut cultivation in PNG according to 2000 PNG national census (National Statistics of Papua New Guinea 2001). This represents about 64% of the total households in the coconut growing regions and 31% of total households in PNG. Currently, it is estimated that a total of 1.5 million people are involved in growing, processing or consuming coconuts or coconut products in PNG.

Contribution of the coconut industry to the national export earnings

In terms of export value over the period 2001 to 2010, all the major agriculture commodities contributed a total of K13,543.5 million to the economy of PNG. In terms of total exports, all major agricultural commodities accounted for 12.4% while coconut products (copra, coconut oil and copra meal) contributed 1%. Coconut products ranked fourth as important agricultural

export commodities behind palm oil, coffee and cocoa.

A total of K1 billion has been contributed to the national economy of PNG by the coconut industry from 2001 to 2010. Despite the challenges the industry has faced because of deregulation in 2002, it has continued to generate an average of K80 million per year in the past five years. This represents 73% of the amount generated before deregulation. In 2008, export revenue from coconut products reached its highest level at K247.8 million, due to copra producers' positive response to the high copra prices that prevailed in the first half of the year. The production of more copra resulted in increased coconut oil output and a record high total revenue for coconut products in 2008.

II. Coconut Production in CY 2009, 2010, 2011 and Forecast for CY 2012

II.1. Coconut Production

The estimated 1,742 million nuts per annum from 2008 to 2009 (Table 1) are based on the assumption that coconuts on 221,000 hectares are productive. Assuming if all the nuts were

Table 1: Annual Coconut Production in Nut and Copra Equivalent

Year	Area 1000 Ha	Potential Nuts (Millions) ^a	Copra Equivalent (MT) ^b	Actual Copra Production (MT)
2009	221	1,495	299,000	96,678
2010	221	1,495	299,000	138,735
2011	221	1,495	299,000	119,982 ^c
2012	221	1,495	299,000	121,860 ^d

Notes: ^aData based on 221,000 ha of coconuts x(6,765 nuts/ha/yr.)

^bPNG conversion factor is 5,000 nuts per MT copra.

^cTimeseries method was used to forecast 2011 by averaging actual production from 2007 - 2010.

^d Timeseries method was used to forecast 2012 by averaging actual production from 2008 - 2011.

Source: Kokonas Industri Koporesen

processed into copra, an estimated 299,000 MT of copra would have been produced per annum (Table 1). As the copra improved towards the end of 2010 and January 2011, it is forecasted that 2010 and 2011 might have a slight increase in the number of nuts produced.

a) *Copra prices*: In certain parts of PNG coconut is one of the important sources of income for families in rural areas where there is no other alternative source of income. However, these rural farmers do not entirely depend on coconut for their livelihood. The farmers will continue to make copra if the prices are profitable for them in terms of their time commitments in a day or a week. So when the prices are high farmers will ensure to collect more coconuts, even from gully areas where they would not normally collect nuts.

b) *Labour intensity*: Copra production is fairly labour intensive and farmers often have to hire labourers to pick and cut the copra if they want to harvest their entire plantations. The following scenarios are common in New Guinea Islands region:

- When the price of copra is low farmers cannot afford to pay the wages of the labourers and so a proportion of their coconut plantations are unharvested and production is reduced. This occurs because the marginal costs of labour required to pick, process and carry more copra to transport collection points are too high when prices are low.
- When the price of copra is high farmers can afford to hire labourers and start collecting larger proportions of their plantations thus increasing production.

- In PNG, the collecting effort is quite low — nut is collected after it has fallen: this contrasts to India, Indonesia and the Philippines where the fruit is harvested off the palms

c) *Low Economic Return*: An analysis on the return on labour for copra production highlighted that copra provides a relatively low return to smallholders. For the average smallholder, this return would cover the costs of:

- labour involved in collection of nuts off the ground
- labour involved in de-husking the nut plus removing and sun-drying the kernel or the use of a drier; and
- transport of the copra to a buying point
- his process involves labour and time that could be devoted to other income earning and household activities

d) *Opportunity costs*: In certain parts of PNG alternative employment or income generation opportunities are scarce that copra production becomes an attractive option. This option becomes viable for islands or remote coastal areas provided shipping services are reliable and road links are accessible.

e) *Agronomic conditions in coconut growing areas*: Eighty per cent of copra in PNG is produced by smallholders who grow the crop on blocks ranging in size from one to three hectares. In general, these smallholders practice low-input coconut farming systems resulting in low palm productivity per hectare and substantial yield declines attributed to pests and diseases. KIK and PNG Cocoa & Coconut Institute Limited (CCIL) will continue

to investigate the field production problems encountered by the smallholders so practical long-term solutions are developed.

f) *Senility*: A critical factor that will affect the future production of coconut is the senility stages of most of the coconut stands in the main coconut growing provinces (refer to Section II.3). The stakeholders in the coconut industry have long recognised the aging issue of coconuts but no real attempts have been made to develop practical ways of replacing the senile palms. KIK is addressing the senility issue as a challenge that needs the cooperation of all relevant stakeholders working together utilising the public-private partnership to identify funding sources to undertake the national coconut replanting programs over the next 10 years.

II.2. Area under Coconut by Region

There are 14 provinces that grow coconut and are grouped into three coastal and maritime regions as shown below:

Region	Provinces
New Guinea Islands:	East New Britain, West New Britain, New Ireland, Bougainville and Manus
New Guinea Mainland:	Morobe, Madang, East Sepik and Sandaun
Southern:	Western, Gulf, Central, Milne Bay and Oro

PNG reported in previous APCC meetings that the area under coconuts has decreased from 248,000 hectares to 221,000 hectares (Table 3). The decline was attributed to an estimated 15% of land replaced by oil palm developments in West New Britain, New Ireland and Milne Bay provinces in 1980s. Another 1,000 hectares

has been lost to pests, diseases and bush fires. KIK has assumed that no major changes in land area occurred from 2008 – 2010.

It should be noted that New Guinea Islands region has the largest area under coconuts (70%), followed by New Guinea Mainland (20%) and Southern region with (9%). It is also assumed that no major changes occurred in the land areas devoted to coconuts.

KIK plans to undertake a countrywide appraisal of existing coconut blocks and plantations in PNG to verify the actual area under coconuts. KIK will be collaborating with CCIL and provinces to conduct the appraisals, which will be funded by the Government over a four-year period.

Name of Region	2009	2010	2011
New Guinea Islands	154,880	154,880	154,880
New Guinea Mainland	45,440	45,440	45,440
Southern	20,680	20,680	20,680
	221,000	221,000	221,000

II.3. Age Profile of Coconut Trees

No surveys have been conducted to determine the age profile of coconuts in the coconut growing districts in last decade.

The age profile in Table 4 shows that less than 1% of the palms are 10 years or below while the 49% are bearing and 50% are senile.

It is apparent that coconut senility is a major issue for PNG to address urgently through its replanting programs in the next 10 years. Most Papua New Guineans find it difficult to replace old coconut palms

Table 4: Age Profile of Coconut Farms (CY 2011)

Percentage Young Palms (1 – 10 years)	Percentage Bearing Palms (Above 10 - 60 years)	Percentage Senile Palms (Above 60 years)
< 1%	49%	50%

Source: Kokonas Industri Kaporesen

because these are used as land marks demarcating land boundaries in villages. There was also no promotion for coconut replanting in the provinces over the years.

II.4. Constraints / Issues Related to Coconut Production and Farm Productivity

The major constraints to coconut production and farm productivity are outlined below:

a. *Soil nutrient deficiencies:* A coconut nutrition study in PNG revealed that there is wide spread nitrogen, potash and chlorine deficiencies in the coastal and maritime provinces. Smallholders do not apply fertilizers because of financial constraints. Plantations may apply fertilizers when the copra prices are high.

b. *Low in-put farming systems:* Currently all smallholders practise low in-put farming systems. Most farmers do not normally take time to maintain their coconut blocks when copra prices are low. The other reason is related to the lack of effective extension services provided by KIK and CCIL.

c. *Lack of resources:* Most smallholders lack physical (e.g. tools and chemicals) and labour resources to produce and process good quality coconut products. This is due to financial constraints as most financial institutions are reluctant to provide credit to coconut farmers.

d. *Copra is a non-profitable coconut product:* The price of copra is lower than that of

crude coconut oil in the world market. The main reason for young people not interested in making copra is because it does not provide a viable source of income compared to coffee, cocoa and rubber. KIK and CCIL are exploring ways in which to make coconut production a profitable venture for smallholders.

e. *Bio-security threats:* Two major bio-security threats are affecting the coconut industry at this stage. Scapanes and Rhinoceros beetles, have destroyed all hybrid coconut¹ plantings in the New Guinea Islands provinces. The recently identified Bogia Coconut Syndrome (BCS) caused by a phytoplasma is also gradually killing coconuts in Bogia District in Madang Province. KIK and CCIL, in collaboration with other key stakeholders, are monitoring the progress of these threats in the provinces throughout PNG. The lack of funding support from the National Government from 2007 – 2010 has also delayed the comprehensive delimiting survey of Madang Province in order for it to be declared as a BCS province in PNG.

f. *Lack of capacity to produce coconut seedlings:* CCIL currently produces hybrid coconut seedlings but does not have the capacity to produce the required 13.5 million seed nuts² for replacing the senile palms in the coconut growing provinces over a period of 10 years. KIK and CCIL have

¹ CCI currently produces hybrid coconut seedlings derived from crossing Rennel tall (Solomon Islands origin) with Red Malayan dwarf.

² 13.5 million seed nuts were derived in the following manner: 221,000 hectares x 50% senile coconuts x 123 palms/hectare.

promoted hybrid coconuts for replanting, under-planting and expansion over the last decade. However, the susceptibility of hybrid coconuts to beetle damage has discouraged farmers from planting hybrid coconuts.

g. Poor Extension Services: The ratio of extension officers to farmers in a districts is about 1:9,500. This reflects the difficulty the provinces are having in terms of providing a decent extension service to farmers. In the case of coconut crop, CCIL either has a single officer (e.g. Manus Province) or two officers to provide extension advise to coconut farmers in a province. Due to manpower constraints faced by CCIL it is not able to assist many coconut farmers in the districts.

II.5. Policies to Promote Coconut Farm Productivity and Increase Farmers' Incomes

KIK and CCIL in consultation with other stakeholders, has been formulating appropriate policy guidelines to address issues affecting coconut farm productivity and improving farmers' incomes in the following areas:

- (a) *Coconut Based Farming Systems:* KIK and CCIL are promoting the coconut based farming systems to address (i) the soil nutrient deficiencies and (ii) low in-put farming systems. CCIL is developing appropriate coconut based farming systems on its research station.
- (b) *Mobilization of Coconut Farmers and Credit Facilities:* Currently most financial institutions are reluctant to provide credit to coconut farmers simply because coconut farmers are not organised into farmer cooperatives for pooling their

resources. As a consequence most smallholders lack physical (e.g. tools and chemicals) and labour resources to produce and process good quality coconut products. KIK and CCIL will be working with relevant government agencies to mobilize farmers into cooperatives to achieve economies of scale in their coconut production.

(c) *Developing an appropriate mix of coconut products:* KIK and CCIL will be developing a model for coconut farmers to produce an appropriate mix of coconut products which will result in a higher income compared to copra. The approach is to explore ways in which to make production of a mix of coconut products as profitable ventures for smallholders.

(d) *Management of Bio-security Threats:* KIK and CCIL are working with relevant government agencies (e.g. DAL, National Agriculture Quarantine & Inspection Authority (NAQIA), Oil Palm Research Association (OPRA), Provincial Agriculture Divisions, etc.) to monitor the bio-security threats in the provinces. For example, a Technical Steering Committee has been formed to address the Boga Coconut Syndrome. This committee has developed effective quarantine measures for pests and disease control in provinces (e.g. restrict movement of coconuts within and between provinces) but need funding support.

(e) *Establishment of New Coconut Seed Gardens and District Nurseries:* Four new coconut seed gardens at strategic locations in PNG have been established between 2010 and 2011. In addition to the two existing coconut seed gardens and have so far established 13

coconut seedling nurseries in the provinces where the seed gardens are for ease of access by farmers. This is done in order to facilitate the training of coconut farmers to undertake effective replanting and under-planting coconuts in their blocks. The susceptibility of hybrid coconut palms to scapanes and rhinoceros beetle attacks has led KIK and CCIL to promote the multiplication of local tall varieties in nurseries for the rehabilitation and replanting program.

(f) *New planted areas:* From 2006 – 2008, a total of 1,338 ha has been planted. National Coconut (and cocoa) Production Improvement Project funded by the PNG Government has been responsible for rehabilitating and replanting a total of 144 ha in 2010/11 [35% hybrids and 65% local tall varieties]. Hence, between 2006 and 2011, a total of 1,482 ha planted. Based on demand from stakeholders, the CCIL forecasts that 600,000 seedlings or an estimated 5,000 ha to be planted in 2012.

(g) *Effective Extension:* CCIL has commenced identifying suitable partners in the provinces to undertake relevant extension programs to address the major factors affecting coconut productivity on a per hectare basis (e.g. improved soil and crop husbandry practices, improved technologies for producing alternative coconut products, etc.).

III. Coconut Replanting / New Planting, Rehabilitation and Farm Productivity Programs

III.1. Coconut Replanting/New Planting Program

The program was identified through available information to KIK and CCIL on the number of smallholder blocks and plantations that are either in a rundown or abandoned status. In order for the rehabilitation and replanting program to be mapped out a physical inspection and appraisal of each plantation and smallholder project needs to be conducted.

Landowner groups in the vicinity of the abandoned plantations have shown interest to be involved in redeveloping them. Some landowners have physically moved into such plantations and subdivided them into blocks where they collect nuts, which are either marketed as whole nuts or made into copra for sale.

Some landowner groups and communities have been consulted discussing the possibilities of forming cooperatives to take ownership of the abandoned plantations.

The smallholder and plantation rehabilitation and replanting program is outlined in a proposal submitted to the national government this year for funding in 2012. Specifically, the program is aimed at addressing several issues relating to the rehabilitation of the coconut industry:

a) Abandoned coconut plantations and smallholder blocks: There are many plantations throughout the coastal provinces in PNG that were abandoned when expatriate plantation managers left them. This has been occurring since PNG gained independence in 1975. Most of these plantations were left to private companies and national individuals to manage, however, lack of prudent management skills coupled with low copra prices and high cost of production

have resulted in most plantations and smallholder projects to rundown or have been abandoned.

Over the years, many of the abandoned plantations have been subject to land disputes between various Landowner Groups. Thus, there is a need for land titles of these plantations to be resolved so that interested Landowner Groups or individuals can be given the opportunity to redevelop them.

b) Rehabilitation and Replanting: Many coconut plantations and smallholder blocks have either gone into bush covered with dense under growth or are covered with thick tall grasses such as kunai, elephant grass and creeping plants due to lack of interest by farmers. In addition most if not all of these plantations have coconuts that are still bearing, however, some have gone senile and need replanting. An inspection and appraisal of all plantations and smallholder blocks will be conducted under the rehabilitation program.

c) Copra Processing Facilities: Due to the abandonment of smallholder blocks and plantations, processing facilities have deteriorated beyond repair. Most of these facilities have out lived their operational status and therefore require replacement with new technology on processing of coconut products.

The overall objective of the program is to identify and appraise all rundown and abandoned smallholder blocks and plantations and facilitate rehabilitation and replanting programs. There are seven major outcomes expected from the planned program over a four year period and these include:

1. Rundown and abandoned smallholder blocks and plantations are identified and appraised and ownership status verified and development plans formulated;
2. Three Regional Coconut Resource Centers and central coconut nurseries established and resourced;
3. Nine rundown plantations (i.e. three plantations per region) rehabilitated and replanted;
4. District coconut development plans formulated and district coconut nurseries established;
5. Coconut growers form farmers' cooperatives for pooling their resources for establishing market networks;
6. Members of farmer cooperative trained in replanting and under-planting technologies; and
7. Farmers' cooperatives produce value added coconut products for domestic and export markets.

The beneficiaries to this project will be men, women and youth growing coconut in the fourteen (14) coastal provinces and the forty-two (42) districts. Direct benefits will go to communities and/or landowners or owners of rundown or abandoned plantations and smallholder blocks. General population of the area within the vicinity of the plantations and smallholder blocks would benefit through employment opportunities and as a result improve their livelihood.

Coconut has been grown in these localities for many years and they are of no threat to the environment. In a recent study coconut was shown to be an effective carbon sink provided the crop was grown under adequate growth conditions. Unlike forest trees, coconut allocates the bulk of the carbon (85%) in its perishable parts (e.g. leaves, nuts, peduncles, etc). It is therefore an important source of

organic matter accumulation in soils where coconuts are grown.

KIK and CCIL have begun addressing some of these issues by collating information on rundown plantations. Compiling the list of registered coconut plantations in the three coconut growing regions has revealed that very limited information is available on these plantations. Thus, there is an urgent need to undertake an appraisal to establish and confirm the status of the plantations. In order to conduct the appraisals and execute the rehabilitation programs KIK/CCIL will require National Government funding support through the Plantation Rehabilitation Program because of limited financial capacity.

This is based on the knowledge that there is an urgent need in most coconut growing areas for coconut replanting programs to be planned and implemented immediately. The situation is more urgent for districts with prolonged dry seasons of three – four months as the overall productivity of older coconuts declines earlier than areas with adequate rainfalls.

III.2. Coconut Rehabilitation by Intercropping and Livestock Integration

Coconut as mono-crop is becoming an uneconomical practice in situations where land shortages are occurring as population increases in rural communities such as in the Gazelle Peninsular area in East New Britain province.

The need to develop appropriate coconut based farming systems is being recognised as a practical way of addressing this issue in the long term (CCRJ 2002). However, KIK and CCIL have yet to develop appropriate guidelines for promoting intercropping and livestock

integration under coconuts.

In New Guinea Islands and Mainland provinces, coconut was planted as a shade crop for cocoa. The estimated area of 95,091 hectares under coconut/cocoa intercrop is based on land under coconut/cocoa from New Guinea Islands and New Guinea Mainland (Table 5).

In PNG smallholder coconut farmers do not raise livestock under their coconuts. Currently only Coconut Products Limited (CPL) is practicing livestock integration with coconuts in East New Britain province. The company has four coconut

Table 5: Intercropping and Livestock Integration in Coconut Farms

Year	Intercropping	Livestock
	Intercrop (Ha)	Number of Animals Dispersed
2010	Cocoa – 95,091	Cattle – 2,919
2011	Cocoa – 95,091	Cattle – 2,811

Source: Kakonas Industri Koporese

plantations with cattle paddocks and it had a total herd count of 2,919 in 2010 (Table 5). As of 23 November 2011, the total herd size was 2,811 cattle.

III.3. Coconut Rehabilitation by Fertilizer Application

For commercial coconut production on a plantation basis proper soil nutrient status of the selected site needs to be assessed to determine the suitability of the area to be used for coconut production.

A coconut nutrition study in PNG revealed that there is wide spread nitrogen, potash and chlorine deficiencies in the coastal and maritime provinces where coconut is currently cultivated. However, no in depth studies on the agro-ecological requirements of coconut have been conducted in the provinces. KIK and CCIL will need to develop a program on coconut rehabilitation by fertilizer application under the proposed coconut rehabilitation and replanting program.

IV. Performance of the Coconut Processing Industry

IV.1. Production and Export of Traditional Coconut Products from 2009 – 2011

The main traditional coconut products produced in PNG include copra, crude coconut oil and copra meal. The production and export data for these products are shown in Table 6. The following percentages of copra were exported: 18% in 2009, 25% in 2010 and 29% in 2011 from January to September. The bulk of the copra is milled in the local copra oil mills. PNG exports bulk of the crude coconut oil (CNO) and copra meal produced each year. It is estimated that about 3 tonnes (0.01%) of CNO is used as bio-diesel by local shipping companies to operate their ships. PNG does not produce the following traditional coconut

Table 6: Production and Exports of Traditional Coconut Products from 2009 – 2011

Products	2009		2010		2011 (Jan – Sep)	
	Production (MT)	Exports (MT)	Production (MT)	Exports (MT)	Production (MT)	Exports (MT)
Copra	96,678	17,491	138,735	35,279	119,979	35,279
Coconut Oil	35,100	35,100	44,559	44,559	40,085	40,085
Copra Meal	14,896	14,896	17,955	17,955	21,118	21,118

Source: Kakonas Industri Koporese

products on a commercial scale: desiccated coconut, coconut milk/cream, charcoal, activated carbon and coir fibre. CCIL will be assessing the economic feasibility of producing VCO, charcoal and activated carbon for domestic and export markets.

IV.2. Production and Export of Non-Traditional or Emerging Coconut Products from 2008 – 2010

The only non-traditional coconut product produced in PNG is virgin coconut oil (VCO) (Table 7). It is produced on a small-scale basis for domestic consumption, especially for cooking and as a food supplement. KIK and CCIL are exploring practical ways of increasing the production of VCO.

IV.4. Average FOB Prices of Major Coconut Products for CY 2009 – 2011

The average FOB prices of the major coconut products from 2009 – 2011 are shown in Table 8. The FOB price trends show that they were higher in 2009, then declined in 2010 and improved in the first three quarters of 2011.

Like in other coconut producing countries, farmers only produce a lot more copra when the FOB prices increases beyond US\$500.00 per tonne.

IV.5. Number of Coconut Processing Plants and their Capacities from 2009 – 2011

In PNG no new commercial coconut processing facilities were commissioned for operation from 2008 – 2010. CCIL commenced constructing one VCO plant and one charcoal/activated carbon mill in 2009 and are expected to be completed in 2011.

Table 8: Average FOB. Price of Major Coconut Products per Tonne in US\$ for CY 2009, 2010 & 2011

Products	2009	2010	2011 (Jan-Sep)
Copra	452	460	757
Coconut Oil	728	958	1,102
Copra Meal	197	174	159

Source: Kokonas Industri Koporesen

Notes: Kina/US exchange rates \$1=K3.68

There are three copra oil mills in PNG and these are situated in East New Britain and Madang Provinces (Table 9). The largest copra oil mill is in East New Britain while the second largest one is in Madang. A medium scale oil mill is also located in Madang Province. CPL and COPM continue to experience problems with their old expellers as parts of the expellers come from USA.

IV.6. Update of Recently Adopted National Quality Standards of Coconut Products

KIK and CCIL with the private sector participants recognise that the quality of copra determines the quality of CNO and copra meal. PNG currently uses three grades of copra, namely: Hot Air, Fair Merchandise Standard (FMS) and Smoke copra. KIK is developing a national copra quality standard and it is hoped that it will be released in 2012.

Table 7: Production and Exports of Non-Traditional Coconut Products from 2009 – 2011

Products	2009		2010		2011	
	Production (MT)	Exports (MT)	Production (MT)	Exports (MT)	Production (MT)	Exports (MT)
VCO	Small-scale	Nil	Small-scale	Nil	Small-scale	Nil

Notes: *The kind of oleo-chemical may be specified.

**Other non-traditional coconut products may be specified.

NCP denotes "NoCommercial Production" in PNG.

Source: Kokonas Industri Koporesen

IV.3. Summary of Coconut Product Utilization in the Country for 2011

A potential total number of nuts produced from January to September in 2011 is 1,121 million nuts. Out of these, 21% was estimated to be consumed in daily meals, 0.003% was converted to VCO while 64% was used for copra production. Of the 720 million nuts used for copra, 45% of the nuts were milled into crude coconut oil (CNO) and 20% of the nuts were exported as copra to overseas markets. It should be noted that about 3 tonnes (0.01%) of the CNO is used domestically as bio-diesel by the local shipping companies to operate their ships.

Table 9: Number of Coconut Oil Mills and their Capacities in CY 2011

Company Name	Expeller Units	IC	AU	Expeller Units in Use
Coconut Products Ltd (CPL), East New Britain Province	12 expellers	72,000 MT	45,625 MT	8
Coconut Oil Production Madang Ltd (COPM), Madang	7 expellers	58,000 MT	14,364 MT	2
Pristine Co. Ltd, Madang	7 expellers	4,000 MT	2,400 MT	4

Notes: Expeller Units denote the Number of Units per oil mill

IC denotes Installed Capacity (Annual)

AU denotes Actual Utilization (Annual)

Source: Kokonas Industri Koporesen

KIK monitors the quality of copra exported overseas by undertaking export inspections before copra are loaded onto ships. KIK works with NAQIA to ensure that the export/import quarantine requirements of the importers are complied with before loading the copra onto ships.

V. Marketing and Product Promotion

V.1. Major Destinations of Traditional Products

The major market destinations for the traditional coconut products are shown in Table 10 from 2009 – 2010. The main destinations for copra exports were Australia and the Philippines. The main market destinations for CNO were Netherlands, Germany, UK and Singapore. Australia and New Zealand are the main importers of copra meal produced in PNG. The European Union countries are becoming quality conscience more than ever. The copra meal must contain very low levels of certain contaminants such as aflatoxin and dioxin at acceptable levels as required by the importing countries. In recent times, the European Union has imposed maximum levels of contaminants such as dioxin and aflatoxin. Consumers require high food and feed safety standards because these contaminants affect both human

and animal health. European countries do not accept by-products from copra dried directly over fire using waste materials. In order to avoid aflatoxin contamination, copra must be dried to a moisture content of 6% before it is expelled to extract crude coconut and copra meal.

V.2. Government Policies Related to Coconut Trade and Market

New Government Policies

There have been new important Government development policies or initiatives launched in 2010 that are expected to enhance the coconut trade and marketing in PNG in the long term. The main ones are as follows:

Papua New Guinea Vision 2050: Wealth Creation is strategic focus area two in the Papua New Guinea Vision 2050 (Government of Papua New Guinea 2009). The focus is to develop agriculture, forestry, fisheries, tourism and manufacturing ventures to generate around 70% of GDP by 2050 with the balance coming from mining, petroleum and gas ventures in the non-renewable sector. For agriculture, the vision proposes to establish two major impact agricultural projects in all 89 districts, expand production volume of all major cash crops to enable downstream processing, provide two agriculture extension officers per district, improve the

employment conditions of agricultural officers, and establish a unified agricultural plan by 2015.

KIK and CCIL need to identify from the forty-two coastal and maritime districts where impact coconut development projects should be established and advice the National Government accordingly.

Papua New Guinea Development Strategic Plan (PNG DSP) 2010-2030³: The goal of Agriculture & Livestock Sector under the PNG DSP is that "A world class agriculture sector that is responsive to international and domestic markets for a diverse range of products and provides the best available income and job opportunities" is developed in the next twenty years.

Coconut industry has been identified as an important subsector of the Agriculture & Livestock sector under the economic sectoral strategies. The PNG DSP has set an ambitious production target of 440,000 tonnes for copra to be reached by 2030. This is a challenge for KIK, CCIL and other industry stakeholders have to address during the planning period.

National Agriculture Development Plan (NADP) 2007-2016: The NADP highlights the importance of making the agriculture sector more efficient and competitive through private sector development and growth and increased agricultural exports (DAL 2006). The NADP's priorities for the development of coconut industry are to promote economic production for domestic consumption,

Table 10: Major Market Destinations of Traditional Coconut Products in 2009 – 2010

Product	Destinations
Copra	Australia and Philippines
Crude Coconut Oil (CNO)	Netherlands, Germany, UK and Singapore
Copra Meal	Australia and New Zealand

Note: NCP denotes "No Commercial Production" in PNG.

Source: Kokonas Industri Koporesen

³ Adapted from Agriculture & Livestock, Part 5 Economic Sectoral Strategies, Papua New Guinea Development Strategic Plan 2010 – 2030, pp. 89-92.

downstream processing, value addition and export.

In 2011 DAL revised the NADP with the assistance of ARDSF, an Australian Government AusAID funded program of support using the Agricultural Research for Development (AR4D) approach. The eight components of NADP were expanded into ten (10) new thematic programs and these included: (i) Enhanced productivity and scale of production; (ii) Research and extension for development; (iii) Natural resources and energy management; (iv) Food safety, quality and nutrition; (v) Human capacity development and entrepreneurship; (vi) Agro-processing and marketing; (vii) Information management and communication; (viii) Policy analysis, advocacy and enabling policies; (ix) Institutional capacity strengthening; and (x) Resourcing, management and coordination. KIK thematic programs have been scoped to contribute to the results in the realigned NADP.

Coconut industry: KIK projected to double coconut production to 200,000 tonnes of copra equivalent by 2015 under NADP. However, KIK needs to revise their projected coconut production target for 2015 in the light of the proposed copra production of 440,000 tonnes proposed in the PNG DSP 2010 – 2030. KIK is working closely with CCIL to increase the production of other coconut products (Virgin Coconut Oil, coconut soap, coconut vinegar, coir products, etc) for domestic markets.

Coconut is both a cash crop and a significant food source in PNG. Coconut is a significant food trade commodity in PNG, with growing significance especially in the highland provinces. KIK estimates that about 310 million nuts (equivalent to 52,000 tonnes

copra) are consumed in daily diets per year.

Existing Export and Import Tariff Rates

The Government currently imposes export levies on the following coconut products: Copra – US\$17.00 per MT; Crude Coconut Oil (CNO) – US\$22.20 per MT; and Copra Meal – US\$5.00 per MT.

KIK generates its annual budget by collecting the above export levies. The annual income is dependent on the volume of copra, CNO and copra meal export each year. KIK relies on these levies to fund its annual regulatory operations.

Negotiations have commenced between KIK and the National Government to provide at least 70% annual budget support so that the export levies can be reduced over time. Copra producers and exporters have argued that high export levies are an additional cost to the overall cost of producing copra and CNO.

There is a 25% tariff on copra imported into PNG. KIK is negotiating to remove the tariff because there is insufficient copra produced internally to meet the throughput of existing copra mills.

Support for Coconut Industry Market Promotions

PNG Government support for coconut industry marketing promotions is subject to availability of budget allocations.

VI. Coconut Research and Development Updates

Current Coconut R & D activities

The current coconut R&D activities are undertaken by

CCIL at Stewart Research Station in Madang Province.

a) *Coconut breeding:* The main research activities of the coconut breeding programme have been conducting surveys and germplasm collection throughout PNG for coconut breeding. The main research emphases were to attain higher yielding palms, fast growth, canopy shade precocity, adaptation to local environments, and resistance to insect pests.

A review of research options by DAL with the support of ACIAR concluded that the only option was to introduce insect pest tolerant planting materials. CCIL is attempting to develop insect pest tolerant coconut varieties. The work on screening for insect pest, especially beetle pests, is progressing very slowly due to financial constraints. This is an important coconut breeding component that needs urgent follow up work to identify the resistant coconut varieties to the beetle pest in PNG. Both for smallholders and plantations, resistant coconut varieties are the most economical, environmental and sustainable method of controlling the beetle pest.

b) *Coconut agronomy and farming systems:* The Coconut Agronomy and Farming Systems section address several aspects of coconut cultivation and management. A particular emphasis is given to the agronomic requirements of coconut hybrids, which are being developed by CCI, and to farming systems research.

Two approaches are being investigated to address the coconut senility issues: (a) Under-planting of high-

yielding coconut hybrids in old coconut groves; and (b) intercropping with alternative cash crop species. Several combinations of intercropping are being tested: coconut and vanilla; coconut, banana and pineapple; coconut and pineapple; coconut, cocoa, banana and kava; and coconut, cocoa, pepper and kava.

The project on poverty alleviation using the "coconut based farming and livestock integration approach: an on-farm intervention" is a promising area for the coconut agronomy and farming systems focus. The preliminary results showed that the farmers were willing to adopt the coconut based farming systems approach because of the likely benefits they would be receiving in the long term. Nonetheless, lack of consistent funding for operational and logistic aspects of the project from CCI resulted in the non-implementation of certain components of the project.

- c) *Coconut pathology*: There is no separate program on coconut pathology at CCI. However, with the outbreak of the Bogia Coconut Syndrome (BCS) in Madang at the end of 2007, there is an urgent need to have a plant pathologist located at the Stewart Research Station to focus on coconut diseases. The casual organism for BCS has been identified to be a phytoplasma and delimiting surveys have been done in the hot spot areas in 2008 – 2009.

KIK has been coordinating all the matters relating to the BCS under the direction of the BCS Technical Steering Committee. The following stakeholders are involved in monitoring the BCS in

Madang: KIK, CCI, DA&L, NAQIA, Oil Palm Research Association (OPRA) and Madang Division of Primary Industry. CCI has undertaken preliminary field identification of BCS symptoms in East New Britain and Bougainville in 2010.

- d) *Coconut entomology*: The devastating insect pest attacks by beetles, namely: scapanes beetle (*Scapanes australis*), rhinoceros beetle (*Oryctes rhinoceros*) and black palm weevil (*Rhynchophorus bilineatus*) continue to limit the coconut expansion and replanting programs in the New Guinea Islands.

The entomology research programme for coconuts to investigate control measures commenced in 1992 after the establishment of facilities in 1991. Continuing serious damage and loss of coconuts focussed the Institute's entomology section's research on new ways of pest control. Past attempts to control Scapanes and rhinoceros beetle by conventional use of chemical. CCI has undertaken some strategic research on effective control measures on damaging insect pests of coconuts.

Relevant R&D work has been undertaken by CCI in collaboration with international organisations and other participating countries to identify a synthetic attractant of the beetle *Scapanes australis*. The synthetic attractant was used in plastic traps specifically for trapping beetles in coconut blocks or farms. The beetle trapping technology has not been developed to a stage where CCI can release it to the coconut industry.

The data from screening local coconut populations for resistance to beetles has not been collected so far due to financial and staffing constraints at CCI. This work needs to be funded in order to establish the resistance of the selected elite coconut varieties before these can be released to coconut farmers.

- e) *Coconut downstream processing (CDP)*⁴: PNG has traditionally produced copra from coconut. The Copra Marketing Board (CMB, now KIK) indicated that it would support research into downstream processing of coconut in the late 1990s. The promotion of the coconut value addition was an important strategy as certain products of coconuts such as coconut oil fetched a higher price on the world market than copra. By 2003, the Section had developed a CDP R&D program with six components: (a) Development of suitable coconut oil extraction techniques for small enterprises; (b) Development of edible by-products; (c) Coir and geotextile product development and coco fibre-wood-cement boards; (d) Studies on the utilisation of crude coconut oil as bio-diesel; (e) Development of a suitable and affordable copra drier for the smallholder farmers; and (9) Studies on domestic and international marketing of coconut by products.

⁴ Background information provided by KIK and the Coconut Downstream Processing Section at Stewart Research Station, Madang.



Various Coconut Products from Papua New Guinea

The progress of the above CDSP R&D programs currently undertaken at CCIL is slow due mainly to funding constraints.

Assessment of Selected Coconut Technologies

CCIL commenced constructing a VCO plant, a Coconut Shell Activated Carbon plant and facilities for processing coir fibre at its Stewart Research Station in 2010. The National Government is funding these two projects and it is hoped that the two plants will be operational by the end of 2011. These two plants will be used as demonstration plants for producing

VCO and activated carbon from coconut shell.

The data collected on processing of VCO, shell activated carbon and coir fibre products with relevant economic analysis will assist CCIL to develop appropriate viable small-scale business enterprises for coconut cooperatives to venture into with suitable partners in the provinces.

Extension Approaches

KIK and CCI have realized that the current extension approach is ineffective and too expensive to maintain in the long term. The

reasons suggested for the cause for this

CCI management has commenced the process of reviewing the current extension approach with the objective of developing a better extension strategy using the cascading logic systems. The provincial program managers have also been requested to identify extension service providers in their respective provinces. This should enable CCI to identify suitable partners it can link up with undertaking extension activities in the provinces.

The experience from a few provinces (e.g. Madang, East New Britain and East Sepik) indicates that the private sector players will only focus their extension efforts with cocoa and coconut farmers in areas with high accessibility and not with those in remote areas.

Not enough information on various coconut technologies released by CCI is reaching coconut farmers in village wards in districts and financial institutions (e.g. Savings & Loans Societies, National Development Bank). KIK and CCIL will be addressing this issue in 2011.

In terms of extension literature on coconut production CCIL has not produced any extension publication on coconut production and processing for smallholders. This is a challenge KIK and CCIL need to address as a matter of urgency. It needs to be pointed out that the information required by financial institutions on coconut production is needed to assess the profitability of smallholders and plantations producing cocoa, coconut or both crops. CCIL needs to prepare appropriate cost benefit analysis showing the profitability of producing coconut on either small-, medium- and large-scale enterprises.

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Coconut Seed Garden in Madang, Papua New Guinea