

**Support to the Regional Program for
Food Security in the Pacific Islands
(GTFS/RAS/198/ITA)**

**COMMODITY CHAIN STUDY IN VANUATU
Volume 1
“Outcomes from the investigations implemented in
Vanuatu”**

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Executive Summary

Faced with the challenge of global competitiveness, the Pacific Island Countries (PICs) are looking for opportunities to diversify their agricultural sectors and to exploit their resource base in a more rationale and sustainable manner so as to:

- (i) Maintain and/or increase their degree of food security and self-reliance, and
- (ii) Better counteract food import flows or find new trade prospects on external markets.

The achievement of such opportunities is however threatened by several obstacles which, though varying according to the country, all end up in affecting the overall business performance of the various actors operating within each specific food chain. In order to identify and overcome such obstacles, three chain studies were organized throughout the South Pacific region as part of the activities planned under the “Horizontal Component” (HC) of the FAO regional project: “Support to the Regional Programme for Food Security in the Pacific Islands Countries” (GTFS/RAS/198/ITA).

Each of the three studies was meant to target a different category of agricultural products, which is:

- i) Food security products;
- ii) Import substitution products; and
- iii) Products meant for the export market.

This investigation into the commodity chain of nangai nut in Vanuatu is a collaborative effort between the Italian Institute for Agricultural Economics (INEA) – FAO partner in developing activities under the HC of FAO regional project GTFS/RAS/198/ITA –, the Secretariat of the Pacific Community (SPC) and FAO Sub-Regional Office for the Pacific (SAPA).

The aim of this study, carried out on the islands of Maewo, Ambae, Santo and Malakula, was to analyze each stage of the nangai nut chain (from production to processing, distribution and marketing) and to identify constraints surrounding the development of nangai nut as a sustainable and profitable industry both for the domestic and export markets. From this process, recommendations have been made on how best to address and remedy these constraints so that the potential of nangai nut both in the domestic market and as an exportable product can be realized. This study was based on the analyses of existing literature, of primary information collected as part of the chain study, and also the outcomes of two market investigations carried out on two external markets, namely New Zealand and Italy.

Canarium nut, (*Canarium indicum* var. *indicum*) known as nangai in Vanuatu is a large tree that grows to 40m in height, with a canopy diameter of 30m. It is native to humid lowland zones of Papua New Guinea, the Solomon Islands and Vanuatu. Canarium nut has been cultivated in Melanesia for thousands of years, and is a very important tree in traditional, customary life. It is one of Melanesia’s most useful multipurpose trees, providing food,

timber and oil. In Vanuatu nangai is concentrated mostly in the central and northern parts of the country.

In recent years the importance of nangai nut as a monetary commodity of the people of Vanuatu, has grown significantly. The *Kava Store* in Port Vila, on the island of Efate has been instrumental in promoting nangai nut as a commercially viable product, and nangai is now seen as a high value niche market product. This rise to fame has been so successful, that supplies are unable to meet the local demand, let alone any external market.

The study revealed that the major constraints impacting on the development of the nangai nut industry are relevant to all four islands studied in the investigation, and also reflect deficiencies in transport infrastructure, marketing support and enabling policies in Vanuatu. These include:

- Supply shortages, which are linked to a limited resource base
- Poor functioning of existing marketing systems
- Inadequate technical support available for all operators along the commodity chain.
- Limited knowledge to support quality management systems and certification systems.
- Lack of national policies to support sustainable production, domestic marketing and export trade of this nut
- Lack of producers' organizations, functioning either on a formal or informal base.

Each of the above affects the development of both the nangai domestic and export markets, and in order to ensure that this industry achieves its potential, each constraint has to be addressed, and solutions put in place. Recommendations were based on what could be done to benefit the nangai nut industry in general, what was required to improve the industry's performance within the domestic market and what actions were necessary to start export operations on external markets.

The recommendations essential for improving the industry in general terms focused on supply, (both quantity and quality) and rationalizing the existing market. For the volume of supply to improve, consideration should be given to establishing new commercial plantations, ideally as close as possible to the main consumption areas, and motivating and supporting the communities in the traditional production areas. At the same time measures must be put in place to improve the quality and uniformity of the final nut products through domestication of the species. Plantings can then increasingly be made with selected cultivars, such as has occurred with other indigenous fruits and nuts. What was also apparent from this study was the absence of "new operators", with vision and an entrepreneurial spirit, such as the manager/owner of *The Kava Store*. Private transporters acting as middlemen would also greatly help address some of the weak links in the chain. Finally, standardised methodologies should be established for assessing the quality of the nut-in-shell and of their derivatives, so that quality can easily be determined despite products being accessed from different trees growing in different environments.

Attention to the internal market was highlighted by the study as essential for any progress to be made in the development of the nangai nut industry. The standards and quality

required for the supply of the export market would at this stage be too demanding of the growers in Vanuatu, and so strengthening the domestic market is by far the first priority. This is further supported by the lower request for quality on the domestic market, and so easier to attain, and the relatively rewarding prices paid for nangai nut and its derivatives on the domestic market. As the study revealed there are segments of the domestic market where unmet demand exists – these need to be identified and efforts made to meet this demand.

Two market studies were implemented in New Zealand and Italy, and the results of these are presented in this report. The overall recommendation is that export markets should only be considered once all demand on the domestic market is fully met, because the level of organization and management of the whole chain required for the export market, far exceeds the current capabilities of domestic operators. Both studies highly recommended the importance of collaboration with a local operator in both countries, once nangai nut operators in Vanuatu are ready to embrace the export market. This would bring significant benefits, for example, contacts/linkages already in place, established distribution services, to name a few.

The study highlighted the different products required by both markets with New Zealand favouring the dried, raw kernel, whereas in Italy, the product of primary interest would be a roasted unsalted kernel. The choice of product in both countries would determine the best local operator to engage with. The Italian market is an already mature market and as such the volumes required to start the trade business are expected to be much higher. For this reason, the study strongly advised that any export action be taken first with New Zealand rather than Italy. In the long-term the Italian market could be an interesting market to target, especially with the higher prices that can be achieved.

The study also considered packaging, labelling and price. With both markets, kernels are required to be exported loose inside plastic, vacuum-packed bags of varying weights. Only in Italy did operators express any interest in importing a retail-ready product. Labelling requirements would obviously have to satisfy the various codes and legislations, both national and international. On pricing, the study noted that the price must take into account the time that will be required, in both countries, for the market to accept nangai nut, and also the cost of local (in-country) operators, and at the same time be competitive with similar products, allowing nangai nut to replace them.

Many recent reports, such as the *Pacific 2020*¹, have identified sustained acceleration in economic growth as essential to enable the Pacific to meet the many challenges the region faces, such as “joblessness and unemployment, which can lead to poverty, frustration and potentially, social instability”. This same report also acknowledges the very important role that the private sector plays in driving economic growth. In Vanuatu, it is the private sector, to date, that has progressed the nangai nut industry this far, but as this study has shown, the efforts of the private sector have to be supported by the public sector, and there is an urgent need for all stakeholders to work together, strengthening the commodity chain and ensuring there are no weak links. There is little doubt that nangai nut has the potential to generate

¹ Pacific 2020: Challenges and Opportunities for Growth, Commonwealth of Australia, 2006

income for many communities throughout Vanuatu. The recommendations of this study offer solutions to the constraints identified as holding back this potentially very rewarding industry.

1. Introduction

1.1 The chain study

Faced with the challenge of global competitiveness, the Pacific Island Countries (PICs) are looking for opportunities to diversify their agricultural sectors and to exploit their resource base in a more rationale and sustainable manner so as to:

- i. Maintain and/or increase their degree of food security and self-reliance, and
- ii. Better counteract food import flows or find new trade prospects on external markets.

The achievement of such opportunities is however threatened by several obstacles which, though varying according to the country, all end up in affecting the overall business performance of the various actors operating within each specific food chain. In order to identify and overcome such obstacles, three chain studies were organized throughout the South Pacific region as part of the activities planned under the “Horizontal Component” (HC) of the FAO regional project: “Support to the Regional Programme for Food Security in the Pacific Islands Countries” (GTFS/RAS/198/ITA).

Each of the three studies was meant to target a different category of agricultural products, which is:

- i. Food security products;
- ii. Import substitution products; and
- iii. Products meant for the export market.

More specifically, the countries and the products to be covered by the chain studies were as presented in the box below.

Category of products	Product	Country
1. Food Security	Breadfruit	Kiribati
2. Import substitution	Tomatoes, carrot, mango and papaya	Fiji
3. Intended for the export market	Nangai nuts	Vanuatu

The chain studies were implemented through a collaboration effort between the Italian Institute for Agricultural Economics (INEA) – FAO partner in developing activities under the HC of the FAO regional food security project GTFS/RAS/198/ITA –, the Secretariat of the Pacific Community (SPC) as the regional counterpart and FAO Sub-Regional Office for the Pacific (SAPA). Whilst INEA, SPC and SAPA were assigned the responsibility to conceive the methodology and the tools to implement the study, along with the overall co-ordination of the exercise, a local consultant was tasked with the practical implementation of field analyses and the elaboration of the primary and secondary data/information ensuing from such work.

In the case of Vanuatu, the overall objective of the chain study has been to analyze the current status of facts at each specific stage of the nangai nut chain, from its production, to its processing, distribution and final marketing and distribution. Since the focus of the chain

study in Vanuatu is a fruit locally regarded as having trade potential on the external market, the study also included investigations on two selected markets both within (New Zealand) and outside (Italy) the Pacific region.

The intended result of the study has been the elaboration of an overall strategy to support the domestic public and private sectors in amending the weaknesses and in exploiting the potentials identified with the study, in expanding the domestic production and marketing of this nut, and in tackling existing trade potentials on the two selected external markets.

1.2 Objectives of the chain study

The *overall objective* of the chain study in Vanuatu is to determine a strategy which would support local institutions and operators in developing a sustainable national industry for this nut.

The *specific objectives* of the study relate to:

- a) The description of the current status of facts at each stage of the overall nangai nut industry, including: production, processing, marketing, distribution, supporting services and related institutional aspects. This also includes, at each stage of the chain, a highlight of the main constraints and potentials;
- b) The preparation of an overall industry strategy to overcome identified bottlenecks and to ensure full exploitation of the identified potentials. The strategy would also include recommendations on how to achieve trade potentials within the two selected markets within and outside the Pacific region – New Zealand and Italy.

1.3 Presentation of the contents of the study

The contents of the chain study for Vanuatu is presented in two volumes. While volume 1 (“Outcomes from the investigation implemented in Vanuatu”) summarizes the main findings from the research works implemented in Vanuatu, volume 2 (“Outcomes from the market investigations carried out in New Zealand and Italy”) resumes the results of the two market investigations carried out in Italy and New Zealand to assess the potentials for exporting this nut from Vanuatu.

2. The general context

Nangai (*Canarium indicum var. indicum*) has been growing in Melanesian countries for thousands of years. It is native to humid, lowland zones of eastern Indonesia, Papua New Guinea, the Solomon Islands and Vanuatu, where it favours medium to heavy-textured soils of moderate to high fertility, free to slightly impeded drainage, and neutral pH. Canarium nut is found mainly in lowland rainforest, secondary forest, old garden areas, and is widely planted round villages and settlements. It has been, and continues to be a very important

food tree in Melanesia, and was an important component in one of the world's first known permanent agricultural/arboricultural systems.

The cultivation and utilization of nangai nut in Vanuatu is very limited to specific islands, namely from the central island of Efate to the Banks and Torres Islands in the north. It is believed (and evidenced by the spread) that the nangai moved from the Solomon Islands and Papua New Guinea, mainly with followers of the Anglican Church who came to Vanuatu to train priests and religion teachers.

Growers of nangai supply nuts to the *Kava Store* in Port Vila on the island of Efate though not on a regular basis. There are a number of reasons for this inconsistency in supply, which this study has highlighted.

3. Policy related issues

3.1 National policies

The Ministry for Agriculture, Forestry and Fishery (hereby MAFF) took time to formulate a policy highlighting the importance of forest products. The aim of the policy was to stimulate active involvement from owners of forest resources, from which high value-added products like nangai nuts could be developed. Consequently, in 2001 the government declared 2002 as the "Year of Reforestation" to encourage a nationwide tree planting program. This was spearheaded by the Department of Forestry, in "partnership" with the Chamber of Commerce and Industry, representing the private sector, to oversee the implementation. This initiative gave rise to a medium-term (2002-2006) national policy² for the forestry sector which clearly stated the need for the country to engage in an extensive forestry programme linked with, and supported by a better focused extension service.

The forestry policy statement relating to extension states: "*The forestry extension programs will focus on sustainable forest management, agro-forestry and other tree planting programs, sandalwood management and forest conservation. The Department of Forestry will operate efficient seedling nurseries and will encourage the development of private and community nurseries.*"

The need to target nut tree species was the direct result of buyers demanding more nuts from the farmers. The provincial foresters were therefore urged to assist farmers in establishing more plots either as woodlots or agro forestry plots of the nut species, such as nangai and *Terminalia catappa*. Ensuing activities saw a number of nangai plots

² National Forest Policy of Vanuatu, May 1997. Objectives of this policy include: to promote the private-sector led establishment of plantations of commercial timber species; to establish at least 20,000ha of commercial plantations to provide a future sustainable yield of 160,000cu.m.pa; to utilize local supply plantations with the assistance of local populations or return the land to the landowners; to promote the development of agroforestry systems; to provide advice and awareness to landowners about the importance and use of trees.

established in the country. These national activities were supported by the Secretariat of the Pacific Community (SPC) who funded a nationwide nangai nut seedling development project³ aimed at promoting the establishment of nangai woodlots and plantations. 12,000 seedlings were generated by this project and distributed to Torba, Sanma, Penama, Malapa and Shefa Provinces. For example, in the Torba Province a nangai demonstration plot of 0.5ha was planted with the large kernel variety to: i) stimulate active participation in the reforestation program, ii) facilitate selection of better nut variety as an alternative marketable commodity and iii) also create a base for large volume of products to entice ship-owners to visit the Northern-most province.

The “Vanuatu Export Development Strategy”⁴ formulated by the Department of Trade, Industry and Investment highlights some important objectives crucial to the future of Vanuatu’s position on regional and international trade. The mission of the strategy is to raise economic growth through an improved trading environment in collaboration with relevant government institutions, the private sector and non-state actors in order to establish a solid export base through an appropriate tariff and policy regime. The impact of this strategy on the nangai nut industry is not directly apparent; however in theory the strategy does support a trading environment conducive to and supportive of the nangai nut industry.

Equally important for the future domestic processing of nangai nuts is the decision taken by the Trade Department to support national products with an export potential by reducing tariffs and taxes on certain products used in the processing of raw nuts and the production of finished export goods. By liaising with other line departments, local industries will be supported through the formulation and implementation of government policies which are aimed at regulating the quality of imports. In addition, funds will be sourced from affiliated international organizations to enhance the growth of selected industry sectors. For example, an AusAID-funded project has been investigating the packaging and marketing of the nut, and has demonstrated that limited value adding can produce prices as high as US\$14,000 per tonne.⁵

3.2 Regional policies

Trade policies in the region are supportive of national efforts and at the same promote regional economic integration. There is wide acceptance among Pacific Island Countries (PICs) that an integrated approach to trade is the most effective strategy for engagement in the global economy. Besides efforts ongoing within the WTO framework, there have been

³ Nangai nut seedling project was programmed for a period of 12 months (March 2003–April 2004). The key strategies of the project were: selection of superior nut sources to guarantee large supply of nuts for propagation work in 5 provincial nurseries; to increase nangai seedling production in 5 department provincial nurseries; to provide technical assistance to farmers in support of field planting activities, with the overall objective to increase nut production to meet the growing market demand by increasing participation of rural population in planting more nangai trees.

⁴ The department of Trade, Industry & Investment announced a new export development strategy in 2002. (*Dept Trade, industry & investment November 2002*)

⁵ Taken from Pacific 2020, Challenges and Opportunities for Growth, May 2006

several arrangements/facilities put in place to support trade in-between and from PICs, that is, regional economic integration. The most significant ones are:

- The Pacific Plan;
- The Pacific Agreement on Closer Economic Relations (PACER);
- The Pacific Island Countries Trade Agreement (PICTA);
- The Melanesian Spearhead Group (MSG).

(i) The Pacific Plan is based on countries working together for their joint and individual benefit, that is, regionalism. This does not mean that national endeavours are of less priority but just that a regional approach should be taken only if it adds value to national efforts. The overall goal of the Pacific Plan is to: “Enhance and stimulate economic growth, sustainable development, good governance and security for PICs through regionalism”. To meet this goal, the Pacific Plan has four strategic objectives⁶ one of which is economic growth. The Pacific Plan was endorsed by Forum leaders at their annual meeting in Papua New Guinea (PNG) in October 2005 with the issuing of the “Kalibobo Roadmap Statement” highlighting the significance of the plan, its key priorities and the implementation requirements. In endorsing the plan, the Forum leaders agreed on several important issues, one of which was to expand access to markets and trade for countries signatory of the SPARTECA, PICTA, PACER agreements though also with non-Forum trading partners. The Pacific Plan is generally considered by many of the donor agencies as the driving document for future development in the region. As such, any activity which is in pursuit of any of the four objectives of the Pacific Plan would be eligible for funding by both CROP agencies and regional donors;

(ii) The Pacific Agreement on Closer Economic Relations (PACER) entered into force in October 2002. To date, eleven Forum Island Countries (FICs) – including Australia and New Zealand – have ratified the agreement. The PACER is a framework agreement which sets out the basis for future development of trade relations among all sixteen FICs. FICs who are party to the PACER will use this framework for the gradual economic integration of their economies in a way that supports sustainable development while, at the same time, contributing to their integration into the international economy. A key feature of PACER is the establishment of a programme of trade facilitation measures. Vanuatu, as a member of the FICs, has not yet ratified the agreement since labour mobility, which is guaranteed under the agreement, has yet to be assured for Vanuatu;

(iii) The Pacific Island Countries Trade Agreement (PICTA), which entered into force in April 2003, has been so far ratified by ten FICs – including Vanuatu. The overall objective of PICTA is to provide a trading environment enabling a free flow of goods amongst FICs. It is anticipated that the economic and trade integration process in PICTA would eventually contribute to the gradual increase in trade between FICs (+ 5% by 2008); between the Pacific ACP States (PACPS) and with external states – such as the EU and ACP countries – thus also easing a wider integration into the world economy. The commencement of trade under PICTA depends on the enacting of appropriate

⁶ The four strategic objectives of the Pacific Plan are: economic growth; sustainable development; good governance and security

legislation to effect tariff reductions within the respective parties. This remains the only outstanding issue for some PICTA parties. Although some of the subscribers had indicated they would be ready to commence trade before the end of 2005 or by June 2006, to date Fiji is the only country that has completed all expected requirements and is ready to trade. This provides a real insight into the magnitude and complexity of the endeavour;

(iv) The Melanesian Spearhead Group (MSG) includes all the important nangai producing countries, namely: Vanuatu, Solomon Islands and Papua New Guinea. The MSG trade enabling policies are based on tariff reductions MSG membership could facilitate the creation of lobby groups – such as joint-venture partnerships – to operate on the international market with products like the nangai nut.

4. Domestic production

4.1 Farm structure and production

In Vanuatu, nangai trees are traditionally planted to mark land boundaries, as windbreaks, as part of mixed woodlots and also to guarantee a source of food for the family. In this latter case, trees are planted in home-gardens. Distribution of seeds to new locations is firstly by humans, but other agents like fruit bats and pigeons also play a very important role. Trees are mainly found in scattered woodlots and those harvested are often found growing among stands of coconut trees.

According to existing information (Evans, 1996), it is estimated that in Vanuatu nangai trees can be found on 300,000 hectares of land (mostly forest), with one bearing tree per hectare. These 300,000 trees are estimated to produce 15,000 tonnes nut-in-shell or 2,250 kernels-in-testa in a year⁷. However, commercially available nangai nuts are considerably less than the estimated total resources, with some reports suggesting that only 5% of the total resource is traded.

Although nangai production is not yet a seriously organized farming activity in Vanuatu, the “Year of Reforestation” (2002) marked a change in attitude to nangai production. 5.2 ha of nangai were planted during that year, and also on other islands. As a direct result of these efforts, farmers have adopted a more serious attitude towards tree-planting. However, a complete woodlot survey would have to be undertaken by Forestry to determine exactly how many trees were planted and this, as yet, has not been carried out.

⁷ “Vanuatu: Land-use profile: tree nuts”, 1999.

4.2 Production services

Responsibility for nangai production comes under the Department of Forestry (DoF). This Department is focusing on providing assistance to farmers to establish non-timber forest products, because of the growing importance of nut trees such as nangai and other edible nut tree species.

As previously mentioned, the year 2002 was declared the “Year for Reforestation” to promote serious tree-planting throughout Vanuatu. Donor funding was sought for the purchase of equipment for mechanical planting, to be used by important stakeholders, such as the Department of Agriculture (DARD), the DoF and the Chamber of Commerce and Industries (CCI).

Efforts to promote nangai production in Vanuatu have included: the distribution of substantial quantity of nangai seedlings to interested farmers and home owners by the main DoF nursery at Tagabe, to commemorate the dawn of the millennium and a nangai workshop held in Santo in September 2001 to assist farmers with nangai planting and marketing. Furthermore, the *Kava Store* regularly distributes nangai seedlings free of charge to interested farmers, especially those who are struggling to cope with fluctuations in prices of copra.

The *Kava Store* is currently the only supplier of value-added nangai products to local outlets which also target the tourist market. According to its owner, Mr. Charles Long Wah, this enterprise could supply the regional market, if an adequate supply of raw material could be guaranteed.

In general, Vanuatu’s naturally rich soils provide adequate plant nutrients throughout the life-span of nangai trees. The tropical climate provides optimum conditions for growth and development of trees with adequate rainfall peaking around November to April. The only natural disaster, posing a threat to the nangai trees are cyclones, which can cause at most major defoliation though no other more serious damage to the tree. In fact, the resulting re-growth of the foliage after the natural “pruning” process, promotes a more vigorous development of the canopy thus resulting in more production of nuts.

5. Harvest and post-harvest practices

There is no national service committed to overseeing the harvest and post-harvest practices in the field. Being an emerging industry, the essential services relating to this activity have yet to be perfected for larger production volumes. Current advice for post-harvest handling is delivered exclusively by the *Kava Store*, a private establishment which tries to have its marketing requirements met by nangai suppliers.

Usually, nangai nuts sourced from the islands come in 50kg bags and as nut-in-shell (which is what remains after the harvested nut is removed from its fleshy mesocarp). This practice does not require stringent handling procedures; however, drying of the product (nut-in-

shell) must be done to avoid deterioration. The drying operation is carried out in the natural daylight, but avoiding direct exposure to sunlight. Once the nuts reach the desired moisture content⁸, the fruits are then bagged.

When shell removal at farmer level is done manually, to avoid rancidity caused by cracked nuts, farmers then are challenged to produce significant quantities of nuts-in-testa for the processors in Port Vila. As a result, the volume of nut-in-testa reaching the processor is limited even though the price of VT 400/kilo (US\$ 3. 64/kg) of kernel is seen as lucrative. The relatively small quantity size also makes it difficult to work out favourable arrangements with the airlines for special freight concessions. Undue cancellation of flights further complicates the matter, damaging the farmers' motivation and resulting in an abrupt halt of deliveries to the Port Vila market.

Post-harvest procedures for external markets are expected to meet quarantine protocols imposed by the importing countries, including the EU. A first United Nations Conference on Trade & Development (UNCTAD) sponsored sub-regional workshop on Sanitary and Phytosanitary Compliance and Agro-food Safety and Quality Requirements in selected countries was held in Port Vila for Vanuatu, Solomon Islands and Samoa from 21-22 August 2006. It discussed findings of UNCTAD-commissioned consultancy study on 'SPS compliance and agro-food safety and quality standards' undertaken in the above-named countries. Based on the findings and recommendations of this study, it is envisaged that UNCTAD – jointly with its development partners, including donor agencies – would assist Pacific Island countries (PICs) with technical and financial resources to strengthen their productive capacities and in meeting the stringent SPS requirements required by the export markets. It would also assist PICs to increase their participation in international and regional standards-setting bodies and in WTO Dispute Settlement committees. The government of Vanuatu would benefit from a proposed SPS-related project targeting kava first and other exportable products, including value-added nangai, later on.

6. Marketing of produce

6.1 Market channels

In Melanesia commercial interest in nangai nuts rates very high. Pacific 2020 states "Indigenous tree nuts have the potential to become for Melanesia what the Brazil nut is for the Amazon or the macadamia nut if for Hawaii". Commercial products derived from the nangai tree include nuts and timber, with the nut kernel being used for human consumption. Marketing operations include private and community based production and processing.

The marketing of nangai sees the involvement of only two operators: the farmers and the buyers who purchase directly from them. Therefore, the absence of intermediaries makes the market channel of this nut an extremely simplified one. The only two buyers who, according to this investigation, are reported to be purchasing this nut in significant amounts

⁸ Tests at Dodo Creek Research Station in the Solomon Islands have shown that adequate sun-drying of nuts reduces kernel moisture to less than 5% (Evans, 1991).

are the *Kava Store* and the *Lapita Café*, both based in Port Vila (on Efate island). This is why this study concentrated mainly on producers and the only two active commercial buyers (the *Kava Store* or the *Lapita Café*).

Lack of intermediaries forces the *Kava Store* and the *Lapita Café* to establish personal arrangements with farmers to assure supplies of nangai. Information about new opportunities is seldom disseminated by the popular media; telephone communication between supplier/buyer remains the main link between operators. However, this can be problematic on islands where communication reception is variable and at times, poor. Sometimes information on new market opportunities is transferred by word of mouth from visiting relatives but it usually takes more than one person to convey this information, before any action is taken to harvest and package the nut.

An alternative to the current distribution system, which could have a huge potential in stimulating and strengthening the domestic nangai trade would be to involve ship-owners in this business. In other words, they could be the middle-men. In this way, transport could be assured and transport costs mitigated, thus facilitating sizeable and consistent supplies of nuts to the main buyers in Port Vila.

Besides the *Kava Store* and the *Lapita Café*, which is purchasing limited amounts (50 kg/year) of out-of-testa kernels to be used in the production of cookies, mainly sold to the “Vanuatu Airlines” transport company, a third company was reported to be purchasing nangai in Vanuatu. This company (*The South Pacific Nuts*), was based on Santo island in the late nineties. It tried to export dried whole and half kernels in bulk for secondary processing and sale in the luxury confectionery and patisserie segments⁹, to the EU (through France), but did not succeed and has since disappeared.

6.2 Market price

6.2.1 Prices at farm-gate

Until relatively recently, nangai has never been sold as a purely commercial crop. It used to be sold at local markets as a fresh snack and as a filling component in “laplap” – a local dish made by grating banana or cassava. The highest price ever paid for nangai for 20kg to 50 kg bags of nuts in the shell at the local village markets was around 500 to 1000 Vatu (VT) (or US\$ 4.55 to US\$ 9.10) .

Another common way of trading with this fruit is stringing the nuts-in-testa, along coconut fronds. Strings of about 20-30 kernels are sold for VT 50/string (or US\$ 0.45/string) at the farm gate or at market places in rural areas.

⁹ These attempts were eventually stopped by the EU concerned Authorities which established the nuts did not meet all the requirements expected for “new foods” or “new food ingredients” under art. 3) of the EC Regulation N: 258/97.

As previously mentioned, the *Kava Store* is the sole commercial entity purchasing nangai directly from the farmers in significant amounts. The proprietor is a renowned food technologist, both in Vanuatu and in the region, and also the original promoter of value-added local products, mainly fruits and nuts. On a much smaller scale (50 kgs/out-of-testa kernels/year), *The Lapita Café* is sourcing nangai directly from farmers located on Efate island¹⁰.

Prices offered by *Kava Store* to producers vary according to the products, that is, nut-in-shell and the nut-in-testa (shell removed). During the last marketing season (2005), nuts-in-shell were reported by the *Kava Store* owner to have fetched a price of VT 40/kilo (US\$ 0.36/Kg), against a price of VT 400/kilo for the nuts-in-testa¹¹ (US\$ 3.64/kg). The *Lapita Café* reported paying a slightly higher price of VT 450/kilo (US\$ 4.09/kg) for the kernels purchased from producers on Efate island.

Market prices in Port Vila for nut-in-shell and nut-in-testa can be reasonably estimated at around VT 45-50/kilo (US\$ 0.41-0.45/Kg) and VT 450-500/kilo (US\$ 4.09-4.55/kg) respectively. Prices for both the nut-in-shell and the nut-in-testa do not appear to have changed during the last 7-8 years, since the prices for the 2005 marketing season are the same as those reported for the 1999 marketing season¹².

Nut-in-shell is less perishable than the nut-in-testa, which is obtained by cracking the nut-in-shell. This makes inter-island transport easier and so facilitates trade from the most remote parts of the country, such as the islands located in the northern part of Vanuatu. Nuts-in-testa need to be processed within twenty-four hours from cracking to avoid spoilage. This means that farmers supplying nuts-in-testa have to either live near the airport or organize the cracking operation close to an airport.

One of the problems affecting the supply of cracked nuts to the *Kava Store* is the attitude of the farmers. The tendency is to harvest nuts only when money is required for necessities such as school fees, marriages, funerals and church donations. Consequently the supply of nuts is haphazard and rarely adequate in volume. This attitude, prevalent on all islands of Vanuatu, has been noted by other researchers who have studied the nangai supply chain over the last 10-15 years (Licht, 2004; Emmet, 2004).

In addition to the supply constraints previously discussed, namely remoteness of production areas, lack of transport facilities, deterioration after cracking the nut and the seeming lack of interest in making money except for a specific reason, farmers are also disadvantaged by the absence of an effective market information service. Despite the existence of a lucrative domestic market for nangai, the large majority of farmers in rural areas appear not to be

¹⁰ The *Lapita Café* is a food processor based in Port Vila who uses nangai as an ingredient for the production of cookies that are mainly sold to Air Vanuatu. Based on the outcome of an interview held on 24th May, 2005 with the owner of this establishment, the amounts purchased are reported to range in the area of 50 kgs of kernels-out-of-testa (equivalent to about 450-480 kgs of nuts-in-shell) per year. The price paid is 450/VT/kg of kernels (2006). Procurement is direct from farmers based in Efate.

¹¹ Information in available literature refers that around 8 to 9 kgs of nuts-in-shell are needed to obtain 1 kg of nuts-in testata.

¹² "Land-use: tree nuts profile", page 17, 1999.

aware of this as they cannot access information through regular media outlets, such as, Radio Vanuatu. A market news service programme operated through Radio Vanuatu by the Department of Agriculture and Rural Development started in 2000 but ceased immediately in 2001 due to absence of reliable staff. During the one-year period of operation of the market news service farmers developed a regular habit of tuning in to the 15-minute prime-time programme each Saturday from 6.15 to 6.30pm. This illustrates the need for such a service to support farmers in the more rural areas.

6.2.2 Prices at markets

Traditionally, nangai nuts are mostly sold on markets in the central and northern parts of Vanuatu. The traditional use of nangai as a component of local dishes is common in the northern parts of Vanuatu and therefore it is readily available for sale at community markets or occasional fairs, where food is sold as a fundraising activity.

The buying price is currently around VT 25 to VT 50 per kilogramme (or US\$ 0.23 to US\$ 0.46/kg) for the nut-in-shell or VT400 to VT500 per kilogramme (or US\$ 3.64 to US\$ 4.55/kg) for the nut-in-testa (kernels with testa).

Nangai as a snack is sold when in season at local markets at very cheap prices, depending on number of vendors and the availability of disposable cash at hand. At these markets the prices can range from VT20 to VT50 (US\$ 0.18-US\$ 0.45) for nut-in-testa strung on fronds¹³. It is also sold as bundles at VT100 (US\$ 0.90) per bundle (20-30 little strings tied together so as to make a larger bundle). Also at rural markets it is not uncommon to find cooked nangai as fillings in traditional “laplap”, sold at VT50 (US\$ 0.45) per piece.

In the two urban markets of Vila and Santo the nangai becomes more of a delicacy, when sold either as a fresh nut snack or a processed value-added product.

Most Ni-Vanuatu prefer to eat nangai fresh as they do with most other nuts. As a fresh nut it is sold at VT100 (US\$ 0.90) per frond (20-30 nuts per frond) in the urban fresh produce markets, against the VT20 to VT50 (US\$ 0.18-US\$ 0.45) per frond in rural markets. When used as fillings for “laplap”¹⁴ the selling price can be up to VT100 (US\$ 0.90) in the urban market, double that found in the rural markets. Fresh nut-in-testa are sold in local markets in Vanuatu in bundles or skewered on palm frond spines for the equivalent of VT1000 to VT1,700 per kilo.

It is also sold in supermarkets at a much higher price. In an urban setting the nangai assumes the characteristics of something exotic comparable to commodities such as ice-cream and French fries.

Processed nangai nuts come in several preparations; the most popular one being the dried, roasted and honey-coated kernels, produced by the *Kava Store*. The price is much higher

¹³ About 20-30 nuts per frond.

¹⁴ Local dish made of grated roots or bananas.

due to labour and processing costs, and packaging requirements for meeting quality control standards and related overhead costs.

Both tourists and local consumers (including school pupils) are targeted with nangai nut products, which are sold at various outlets, such as tourist resorts in the form of souvenir packs or as a processed nut product in supermarkets. Consumer demand for all of the products is high and supply is affecting marketing efforts.

In Port Vila the dried, roasted and honey-coated kernels are retailed in plastic bags and plastic/glass jars for prices ranging from about VT2000/kg (about US\$ 18/kg) up to almost VT2400/kg (around US\$ 22/kg). Table 1 below summarizes the prices for some processed products found on sale in Port Vila inside the main supermarket chain of Vanuatu (*Au Bon Marché*).

Table 1 - Prices of selected processed products (Port Vila -*Au Bon Marche*'-May 2006)

Kind of product	Weight (grams)	VT/Kg	US\$/Kg
<i>Sugar coated nuts in plastic jar</i>	100	2350	21.40
<i>Sugar coated nuts in plastic bag</i>	300	2600	23.64
<i>Roasted nuts in small plastic sachet</i>	15	2335	21,23
<i>Sugar coated nuts in glass jar</i>	N/A	1950	17,73

Source: Information collected by Mr. Andrea Serpagli, FAO Consultant, on 23 May, 2006.

Note: Exchange rate: 1US\$ = 110 VT (May 2006).

6.2.3 Marketing and trade services

Compared to other exportable products, value-added nangai is an emerging industry, and as such there has not been a serious government intervention aimed at establishing standards for processed nangai. For example the government has not appointed any institution with the responsibility of developing food standards which would be acceptable by market destinations.

There is only one laboratory currently operating in Vanuatu which can undertake basic tests on food products. It operates under the Ministry of Trade and lacks equipment for detailed analysis, such as the nutritional analysis of foods. Vanuatu does have a Food Act¹⁵, however, which was revised in 1988. It allows for “persons not to display, store or sell food unfit for human consumption” and “powers of health inspectors to enter premises and take samples”

In terms of services supporting trade, Vanuatu has very limited support for e-commerce and e-trade. As nangai is a high value product, it could benefit greatly from the availability of these services providing an effective alternative to costly communication services.

¹⁵ Food (Control) Act (cap 128): Commencement April 1981; Revised Edition 1988

Other trade supporting services include transport services to facilitate the movement of products between markets. Nationally, shipping services are irregular and uncoordinated; this poor service greatly affects the collection of products not located along the main shipping routes and means that local exporters of products such as nangai have to wait before sufficient produce is procured. Any attempt by the exporter to organize special runs in order to collect a particular product would prove too costly.

With the inconsistency of supply and the high demand from the domestic market, there would appear to be little need for engaging international shipping services for nangai export. However, Mr. Long Wah of the *Kava Store* has commented that his company exported 2 tonnes of processed kernels to retailers (mainly supermarkets) in New Caledonia during 2003¹⁶.

International shipping lines servicing two ports of entry in Vanuatu, namely Port Vila and Luganville Santo do exist, and the shipping network includes New Zealand, Australia as well as countries in Asia and Europe. Limited air-freight allocation is provided by Air Vanuatu. Air Vanuatu supports local production and local exports, and has offered reduced freight rates for emerging export industries. Processed nangai could enjoy the same services accorded to the dried kava market in the region if there was adequate local supply.

6.2.4 Domestic demand

According to the interviews held with the two main local processors, a high demand for nangai (the raw nut) exists on the domestic market. *Lapita Café* has a contract with Air Vanuatu to supply nangai cookies for in-flight snacks. Locally packaged dried nangai nuts are also a favourite amongst visitors and locals alike as gifts, and these are sold at duty free shops as well as at the *Kava Store*. Locals are learning new ways of using dried nangai nuts in their cooking, especially in pastries and snacks.

The *Kava Store* constantly experiences shortages in the supply of dried nangai. According to an interview held with the owner of this establishment¹⁷, the maximum quantity ever purchased was in the order of 160 tonnes of nuts-in-shell (equivalent to around 19-20 tonnes of kernels-in-testa) in 2003. Domestic official statistics do not provide any estimate on production potentially available in Vanuatu. *Island Business* (July 2005), in an interview with Charles Long Wah, (*Kava Store*) reported that locals currently supply 160 tonnes of nangai nuts each year, which is a mere five percent of all nangai nuts available in the country.

It is increasingly popular for locals to buy direct from the *Kava Store* rather than go to other outlets. One of the most popular packages, sold at VT1500 (US\$ 13. 64), contains about 15

¹⁶ Information collected during an interview Mr. Charles Long Wah had with Mr. Andrea Serpagli, FAO Consultant, and Mr. Rydley Mc Mui, local Consultant, on 23rd May, 2006.

¹⁷ Information collected during an interview Mr. Charles Long Wah had with Mr. Andrea Serpagli, FAO Consultant, and Mr. Rydley Mc Mui, local Consultant, on 23rd May, 2006.

smaller packages of dried nuts. Alternatively large jars are available and are sold at VT700/jar (US\$ 6.36/jar). The small single packs are sold at VT100 (US\$ 0.91) each.

Drying nangai has been the traditional practice of communities in the Banks group of islands in the north of Vanuatu, where nut-in-kernels are hung above the fireplace and constantly heated until the nuts become quite oily. They are then extracted from their shell and grounded further through cooking until they are totally mashed, when they are then used as pudding (laplap) filling. The dish is quite oily and not many Ni-Vanuatu relish the flavour. In contrast sun-dried nuts are quite palatable and most locals will eat these dried nuts. Although the *Kava Store* produces dried nangai nuts, the subsequent supply does not meet the local demand whether for commercial or domestic use. The supply of nangai is inconsistent both in quantity and regularity of delivery. The *Kava Store* has the means to cater for a larger volume of dried nangai but is unable to do so. In most instances, demand outweighs supply and, as the sole producer, the *Kava Store* is unable to meet a growing demand for processed nangai.

7. Environmental issues

7.1 Generalities

Environmental factors impacting on the nangai tree and nangai nut production cannot be overlooked. The nangai tree takes several years to grow and mature: about six to seven in the case of the *C. harveyi* and seven to eight in the case of the *C. indicum*. The fruit (nut) size may also vary, depending on the soil type and structure. The fruits are much larger on some islands than on others, so there is no guaranteed uniformity in nut size.

Nangai nuts perform well in an agroforestry-based system, and so their cultivation is not only economically attractive but also ecologically sound. The nangai tree is a relatively fast-growing forest tree and does well beneath the natural canopy or amongst the mix in a typical food garden clearing, where the sapling can get established while bananas, climbing yams and other crops are cultivated around the tree.

Weather patterns and fluctuation also affect the tree, and obviously can impact on nut quality and therefore consistency of supplies. The archipelago is known to suffer from perennial onslaught of stormy weather in the summer months but the frequency and intensity of these storms are predicted to increase with global warming. However, despite seasonal cyclone threats the nangai tree has generally good tolerance to strong winds. In fact the excessive pruning that occurs during cyclonic winds helps the recovery of the tree to wind damage and, induces early and vigorous growth from damaged branches.

7.2 Environmental and land-use legislation

Current efforts to restock Vanuatu's depleted forests started in 2002. To date over two million poly bags have been distributed around the country for nursery purposes. The contribution of this increased planting as a carbon mitigator under the facility launched with the Kyoto protocol is considered as very significant.

There is no environmental legislation or implementation of environmental management systems that have an impact on the nangai nut industry. However, land disputes issues in the country are increasing, and these do impact on the industry, especially when commercial projects by foreign investors clash with traditionally recognized land boundaries and rightful 'ownership'. The communal ownership of land makes it difficult to enter into entrepreneurial schemes to grow nangai trees for commercial purposes. Locals are 'unsure' of planting nangai trees for commercial purposes because they are concerned that they will face opposition for trying to make personal gains out of land seen to be communally owned.

In most cases there are few locals with sufficient power to convince a community to allow land to be used by a foreign investor or another local for commercial purposes. In addition there is insufficient surplus land available for a relatively large commercial project. The growing population means pressure on the land for subsistence agriculture and this can lead to disputes which can turn violent if garden plots are damaged and set on fire.

More importantly government legislations on land-use and ownership remain archaic and ineffectual, and can hinder the commercial development of nangai. A large percentage of prime agricultural land, especially on Efate, Santo and Malekula, is being taken up for industrial development, thus relegating commercial agriculture and farming to the more marginal land. It is common to find schools, industrial activities and residential areas built on some of the best land on Efate, where farmers could have successfully established thriving commercial farms of nangai or other crops such as vegetable and root crops. In addition, the tourism and hospitality industry is also taking up large tracts of land, thus contributing to the increase in land disputes and the loss of large areas of forests that once held healthy stands of nut trees such as nangai.

8. The investigations

8.1 The methodological approach proposed; the tools and the sample utilized

The methodology followed to implement the study was primarily developed by INEA. The methodology was further discussed and validated during an Inception Workshop¹⁸ held in Fiji at the beginning of May 2006, in collaboration with the three national coordinators (NCs) responsible for the development of the chain studies in their respective countries (Fiji, Kiribati and Vanuatu), FAO-SAPA and SPC.

The methodology proposed required the implementation of the following activities:

- a) The collection of primary data/statistics and other information from relevant national sources;
- b) The implementation of field surveys/investigations;
- c) An analyses of the data collected with the activities at points a) and b) above; and
- d) The writing-up of a report with the investigation findings and ensuing recommendations.

As for Vanuatu, whilst INEA and SPC provided overall guidance and co-ordination, data collection and elaboration was entrusted to a local consultant, who, in turn, made use of local supporting staff to carry out the interviews and enter the data gathered into the spreadsheets provided by INEA.

Field investigations in Vanuatu were planned to target three operators (farmers, traders and processors/exporters) involved in the nangai nut chain, however, research revealed that, in reality, the structure of the nangai nut chain is simpler than expected, and involves only producers and processors/exporters. Only two processors of nangai nut are presently operating in Vanuatu, one of which has at times also acted as an exporter. This meant that the field surveys and activities focused on producers and on the two processors – both based in Port Vila on the island of Efate.

Of the three questionnaires originally designed for this study, only two were finally used to collect the primary information for the investigation. These two questionnaires combined closed and open box questions, with the majority being closed box – see a copy of the two questionnaires in Annex 1. There was considerable variation in the length of the questionnaires; most of the questions were multiple options and not simple “yes or no”. Before being used at field level, the questionnaires underwent changes which reflected both the outcomes of the tests made during the Inception Workshop in Fiji and, later on, at the field level (in Vanuatu) using a representative sample of operators to be investigated.

The total sample size used in this study concentrates on 368 hectares of land supporting scattered woodlots and individual trees. As for the sample utilized, a total of 132 farmers were investigated. At the same time, two processors were also interviewed. It should be stressed that the larger of these two processors (*The Kava Store*) has also been acting as an

¹⁸ The Inception Workshop was held in Suva, Fiji from 15th to 17th May, 2006 at the Secretariat of the Pacific Community, Suva Fiji.

exporter, though not on a consistent basis due to unreliable raw material supply flows from production areas.

While the age of the youngest farmer interviewed was 26 years, the oldest was 88. As Table 2 shows, the largest share (around 54%) of interviewees have an age between 31 and 50 years old, followed by interviewees with an age-range from 51 to 70 years (equal to about 38% of the whole sample). The nangai industry, therefore, appears to be managed by farmers in their middle to old age, possibly not the best age range to work with if there are plans to try and introduce changes of any kind in production practices.

Table 2: Distribution of interviewees according to age

Age range	Absolute value	Percentage
<30 years	4	3.0
31- 50 years	71	53.8
51 – 70 years	50	37.9
> 70 years	7	5.3
Total	132	100.0

Out of the 132 farmers interviewed, 43 reside on the Maewo island; 37 on the Ambae island; 30 on the Malekula island; 16 on the Efate island with the remaining 6 scattered among the Nguna, Pele, Santo and Ambrym islands – see Table 3 below . Only 3, out of 132, of the farmers interviewed, were females. These islands vary very much in size.

As for their educational level, 67% (or 89 farmers) of the targeted sample had received a primary education, whilst 30% (40 farmers) had progressed to secondary education and the remaining 3% (3 farmers) held university degrees. In contrast, with farmers’ spouses 78% (103 individuals) had received primary education, while 20% (27 individuals) had progressed to secondary education and 2% (2 individuals) held university degrees.

8.2 The main outcomes of the research work

8.2.1 Production

As Table 3 below shows, Maewo has been the island with the highest number of producers (43) targeted by the investigation, followed by Ambae (37) and Malekula (30). The total number of farmers on these three islands targeted by the study comprises more than 83% of the entire sample. The reason why the investigation concentrated mainly on Maewo, Ambae and Malekula is that in Vanuatu nangai trees thrive mostly in the central and northern parts of the country.

All (100%) farmers interviewed considered themselves as private entrepreneurs farming nangai on their own land. None of the interviewed farmers, neither belongs to any kind of producer associations (co-operative or other), nor rents or makes use of any land besides the one he/she owns.

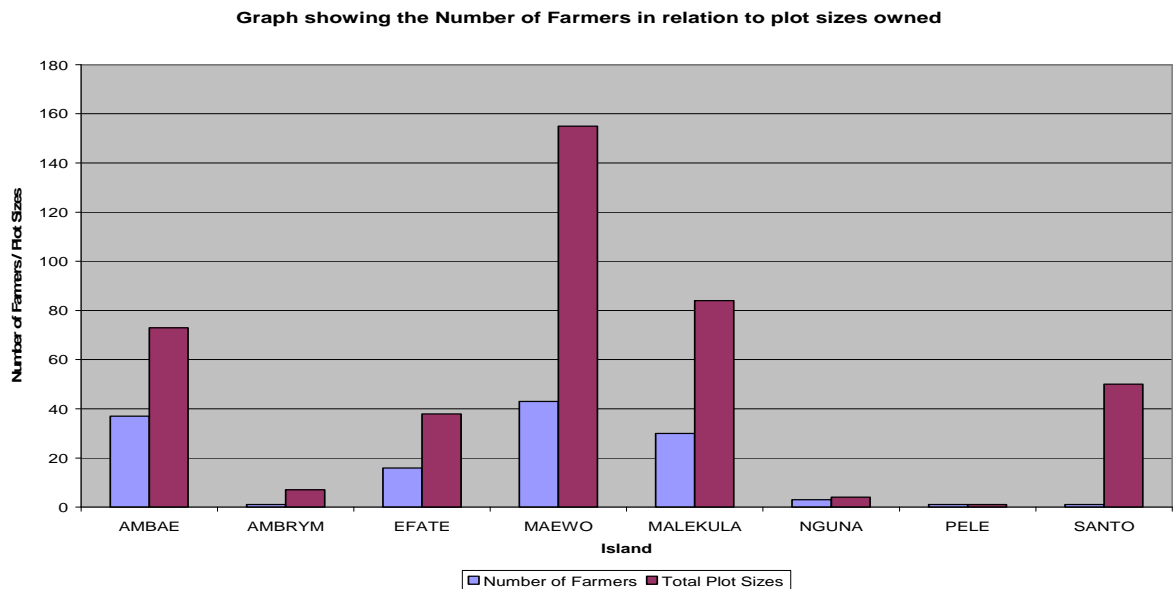
Table 3: Number of farmers investigated and plot cultivated by island

Island	Number of Farmers		Total Plot cultivated	N. plots/farmer
	A.V.	%		
AMBAE	37	28,0	73	1,97
AMBRYM	1	0,8	7	7,00
EFATE	16	12,1	38	2,38
MAEWO	43	32,6	155	3,60
MALEKULA	30	22,7	84	2,80
NGUNA	3	2,3	4	1,33
PELE	1	0,8	1	1,00
SANTO	1	0,8	50	50,00
TOTAL	132	100,0	412	3,12

Note: A.V.: Absolute Value.

On average, as Table 3 shows, each farmer interviewed has access to slightly more than 3 plots of land. As these plots of land are not necessarily pure-stands of nangai, it was not possible to collect the estimated area of nangai production. However, the data reveals that above 4,600 trees are reported as grown by the 132 farmers investigated on the various islands; which means that each farm has slightly more than 36 nangai trees.

Fig. 1: Graph showing number of farmers in relation to plot sizes owned



The growing of nangai trees in communities appears to have a traditional basis and only one farmer, of the 132 interviewed, stated that planting of nangai trees, only took place after 2000. By far, most of the trees were, in fact, reported to have been planted during the '60s, '70s and 80's.

Only 24 farmers (or 18% of the whole investigated sample) emphasized that they owned the trees, in contrast to the 108 farmers (equivalent to an 82% of the sample) who stated the trees belonged to the “family”. This confirms what has already been highlighted by other studies and that is the growing and exploitation of nangai involves the whole family or the entire community. This also explains why the trade of nangai fruits is mostly undertaken when community or family needs have to be met.

In terms of species grown, Vanuatu is known to host two main species of nangai which are cultivated in the Pacific, namely: *C. indicum* (most common in Maewo) and *C. harveyi*, (most common in Malakula). The other islands have a fair share of both species but the survey results show that farmers have a tendency to refer to “folk” varieties, which vary in shape, size, fruit colour at maturation, and flesh colour and texture.

This was confirmed by the investigation, with 56 farmers (42% of the whole sample) growing either *C. indicum* and *C. harveyi* , 19 farmers (16%) the “Yellow Kernel” variety and only one farmer growing a species/variety “other” than the ones mentioned above –see Table 4 and graph 2 below.

Table 4: Species reported according to the island investigated

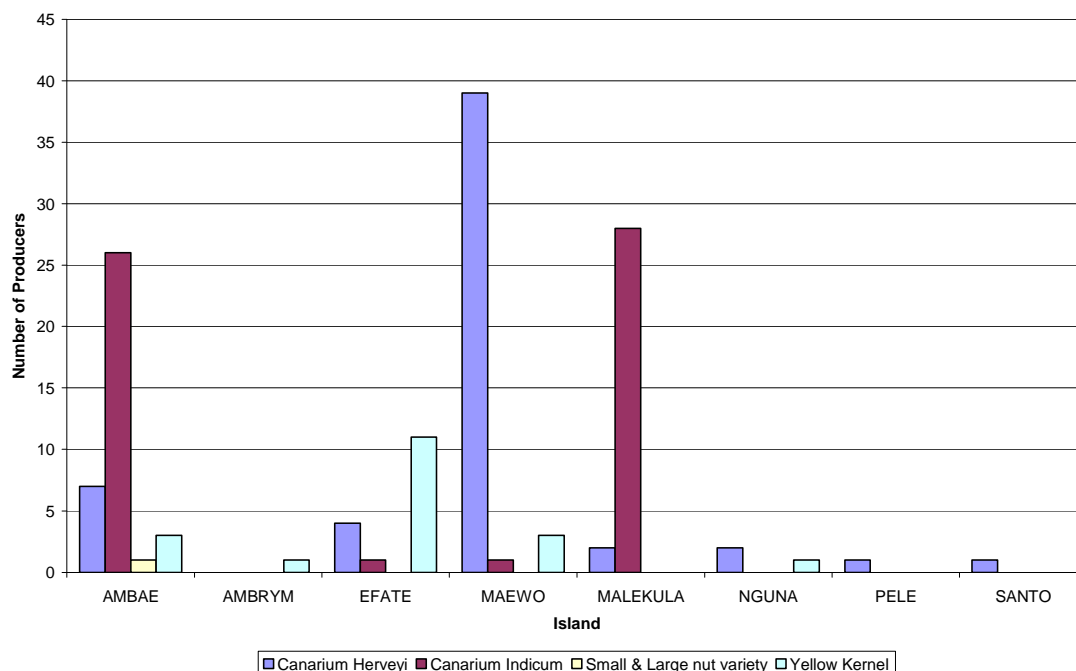
Island	Canarium Harveyi	Canarium Indicum	Small & Large nut variety	Yellow Kernel	Total interviews per island
AMBAE	7	26	1	3	37
AMBRYM	0	0	0	1	1
EFATE	4	1	0	11	16
MAEWO	39	1	0	3	43
MALEKULA	2	28	0	0	30
NGUNA	2	0	0	1	3
PELE	1	0	0	0	1
SANTO	1	0	0	0	1
Total	56	56	1	19	132

Canarium harveyi is most prominent species in most of the northern islands of Vanuatu, with the largest stock located on the island of Maewo. *C. indicum* appears to be largely found on Ambae and Malakula islands. *C. indicum* is generally considered the best species, although most local consumers appeared to be unconcerned with the qualitative differences of fruits from the different species.

Regrettably, the question in the producer’s questionnaire that specifically targeted the amounts of nuts harvested by each farmer interviewed and the way this harvested quantity was then distributed according to the various utilizations (for family consumption, to produce seeds, to pay wages in kind, to barter or to be sold on the market) did not provide consistent results and therefore neither yields, nor use of the harvested crop could be assessed through the investigation.

Fig 2: Graph showing varieties according to island

Graph showing the Varieties in relation to the Islands they are found

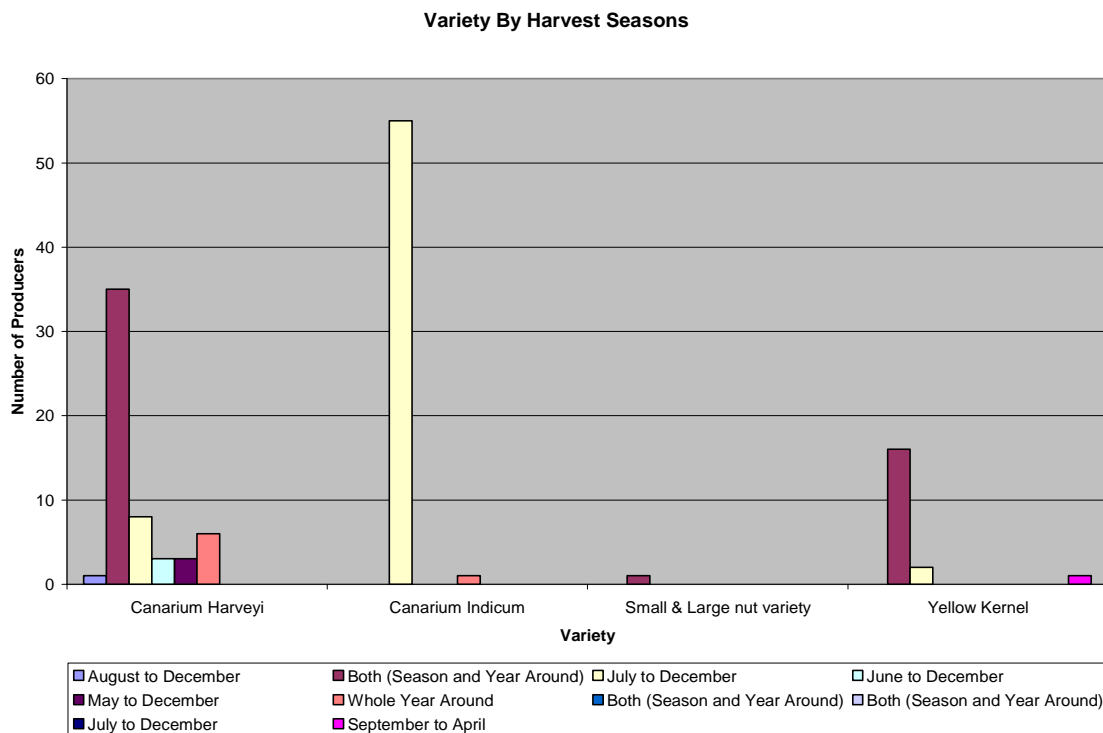


In the existing literature, however, data on the yields obtained in the other major nangai producing Pacific countries, can be found. In the Solomon Islands, for instance, actual yields of nut-in-shell (10% moisture) were found to vary from 80 to 320 kg/tree, with an average on a healthy tree of at least 100 kg nut-in-shell (15 kg nut-in-testa) per year (Evans, 1991). Consequently, yields per hectare can be estimated to be 7700 kg nuts, or 1155 kg kernels per hectare per year from trees older than 20 years old in a plantation planted at a density of 130 trees/ha and taking into account 15% male and a 30% reduction in yield due to close spacing (Maima, 1994).

As for the way harvested crops are used, in very general terms, it appears from the investigation that nangai nut is used for feeding the family (having a high nutritional value because of the protein, oil, vitamin and mineral content), as a seed, in the barter trade and as a good to be sold on the market.

Outcomes from the investigations showed that 48 farmers from the 56 growing *C. indicum* (or 86% of total) harvest nangai from July to December. The rest of the farmers assert to be harvesting nangai the whole year round. All farmers investigated stated they were harvesting nangai nuts manually.

Fig 3: Graph showing harvest season by variety



The normal fruiting season in Vanuatu is between October and January with a peak in November, and history has shown that cyclones in the previous year can lead to earlier flowering in the following year. Fig 3 would seem to indicate that fruiting is taking place earlier than expected. This could be due to the seasonal battering from cyclones that Vanuatu experiences, or some other abiotic factor. With other crops in the Pacific, for example, mango, climatic changes are being held as responsible for changes in fruiting patterns.

The study indicated that no recommended production and/or harvesting practice is followed by any of the 132 nangai producers investigated. This supports results from other studies carried out on nangai. The reason for this could be found in both the communal ownership of these trees – see outcomes of the investigation commented above to this purpose, and the fact that major pests or diseases have not yet been identified for *Canarium* species, especially *C. indicum* (Evans, 1991)¹⁹.

In the same way, none of the investigated producers throughout the various islands targeted with the investigation reported they were making use of any certification (organic, fair trade etc). Taking into consideration that nangai are cultivated in Vanuatu within environments with little or no contamination (having been grown over time as bush trees), the nuts should

¹⁹ However, caterpillars and beetles (e.g. *Amblypelta cocophaga*) and some fungi (*Phellinus noxious*) can attack young trees (Thomson and Evans, 2001).

easily qualify as organic and, therefore, would be able to target highly rewarding markets within or outside the Pacific region.

8.2.2 Post-harvest handling and processing

The investigations revealed that nangai farmers do not own or make use of any kind of post-harvest infrastructure (such as: depots/warehouses, drying facilities or other equipments) to market their harvests.

To take nuts to the selling place, the large majority of farmers (70 out of 132, equivalent to a 53% of the whole sample) use exclusively their own transport, against 49 (37%) who use public transport only; 5 who hire private transport only and the remaining 8 using mixed forms of transport. The distance they travel to the selling place is usually between 1 to 3 kilometres. However, about a quarter of them travel more than 20 kilometres (in some instances, up to 80-100 kilometres).

The selling practice mostly used by growers is direct sales through village/town markets. Sixty eight farmers (52% of the whole sample investigated) exclusively use this channel to market their harvests. However, 115 (equivalent to 87% of the whole sample investigated) farmers who sell at least 80% of the nut supply he/she has available through this channel. Only 2 farmers sell everything they have either to retailers or wholesalers operating in markets, thus confirming that sales are a matter dealt directly by the growers. No one reported they were selling to supermarkets and/or hotels.

In terms of post-harvest operations carried out by farmers, although all the answers provided by framers interviewed focus exclusively on the last operations prior to the marketing of the kernels (e.g.: removal of testa, packaging and stringing of the kernels), it is obvious also that the post-harvest activities prior to those highlighted also need to be dealt with by the farmer. In other words, all farmers (or their family members) seem to be involved in most of the post-harvest operations preceding the sale of the nangai kernels. However, 40% of the investigated farmers (53 out of 132) report they were involved in the “stringing of the kernels”, the last of the post-harvest operations implemented before kernels are sold via the most traditional market channel – which is the one made up by rural/urban markets. This might also indicate the lack of sale alternatives outside of this traditional channel, such as traders or processors like those operating in Port Vila or middlemen who could take the nuts/kernels to other consumption places.

Although “grading” is mentioned only once among the post-harvest operations implemented by farmers investigated and despite the fact that there was no mention of the use of any specific, formal criteria to grade the nuts/kernels – the few answers available indicated that grading is really to buyers’ criteria, and that the farmers appear to have clear in their mind how the produce needs to be graded. All of them, in fact, indicate the size of the nut-in-shell as the most important criteria to follow in the grading of this fruit²⁰.

²⁰ According to existing literature, the quality of dried nangai nuts is determined by kernel mass to nut mass ratio (Evans, 1994) and graded accordingly. This ratio measures the yield of kernel-in-testa from a given

The cracking of nuts is done manually by all investigated farmers. Usually, hammers or stones are used. Care has to be taken not to damage the kernel. The cracking of nuts is a laborious, costly operation and can result in injuries. Different rates of nuts cracking are reported by existing literature throughout the Pacific region²¹. Even at the higher rates, nut cracking is seen as a constraint to the expansion of commercial interest in nangai nuts. Mechanical systems have therefore been investigated. The *Kava Store* developed a prototype for cracking the nuts mechanically but given the high percentage of kernel breaking resulting from mechanical cracking, the owner of the *Kava Store* still prefers to have the nuts cracked manually using the cracking system he has established in Port Vila during the harvest season. This system ensures, among other things, the integrity of the kernel, which is a fundamental factor in fixing the purchasing price of final kernels²².

All farmers investigated indicated that nuts are packed prior to their sale. No one labels the packages used to market the harvested product. In the same way, no one makes use of any recommended post-harvest practice, such as enforcement of measures assuring due hygiene of final supplies or safety on working places (such as during nuts cracking) or correct storage of packing materials. In other words, investigation findings confirm this business is still conducted according to very traditional methods.

Farmers seem to know very well where and to whom they have to sell their harvests. About 93% of them (122 from the 132 investigated) indicate that they already have this information, with the remaining 7% being advised by neighbours and friends or others –one farmer uses information provided by local extension staff.

As for the workforce used in activities relating to the production, harvesting, post-harvesting and selling of nangai, outcomes provided by the interviews very clearly show that the labour comes exclusively from within the family. No labourer is ever reported as hired for any activity relating to the production, harvest and marketing of the nangai nuts in Vanuatu, thus confirming the nangai business to be an exclusive family business.

While the husband, his wife and – though at a slighter lower level – their sons are the ones involved in production and harvesting operations, it is mainly the husband and his wife who transport the goods to the market (although the contribution of their sons is also

weight of nut-in-shell. It has been established that *C. Indicum* has a K: N ratio ranging from: 0.10 to 0.27 (Evans, 1991). Below 0.10 the nut would be rejected; above 0.27 would be grade: AA; in between the two values, grades: A, B and C would be included.

²¹ In Papua New Guinea, the output per hour of traditional hand cracking has been reported to be 0.5 to 3.7 kg/hr/person (Wissink, 1996) with an average kernel yield varying from 1.2Kg to 2.7 kg per 20 kg nut-in-shell. In the Solomon Islands, higher rates of nut cracking have been reported (19-32 Kg of nuts-in-shell/cracker/day), depending on shape, size of the nut, shell thickness, skill and motivation of the crackers (Evans, 1991 and 1994).

²² Outcomes of a conversation that the owner of the Kava Store (Mr. Charles Long Wah) had with Mr. Andrea Serpagli, FAO Consultant, and Mr. Rydley Mc Mui, local Consultant, on 23rd May, 2006.

significant), while the women – along with their sons – are the ones who finally sell the products in the markets.

As for the constraints related to nuts production, farmers investigated provided the feed back summarized in Table 5 here below.

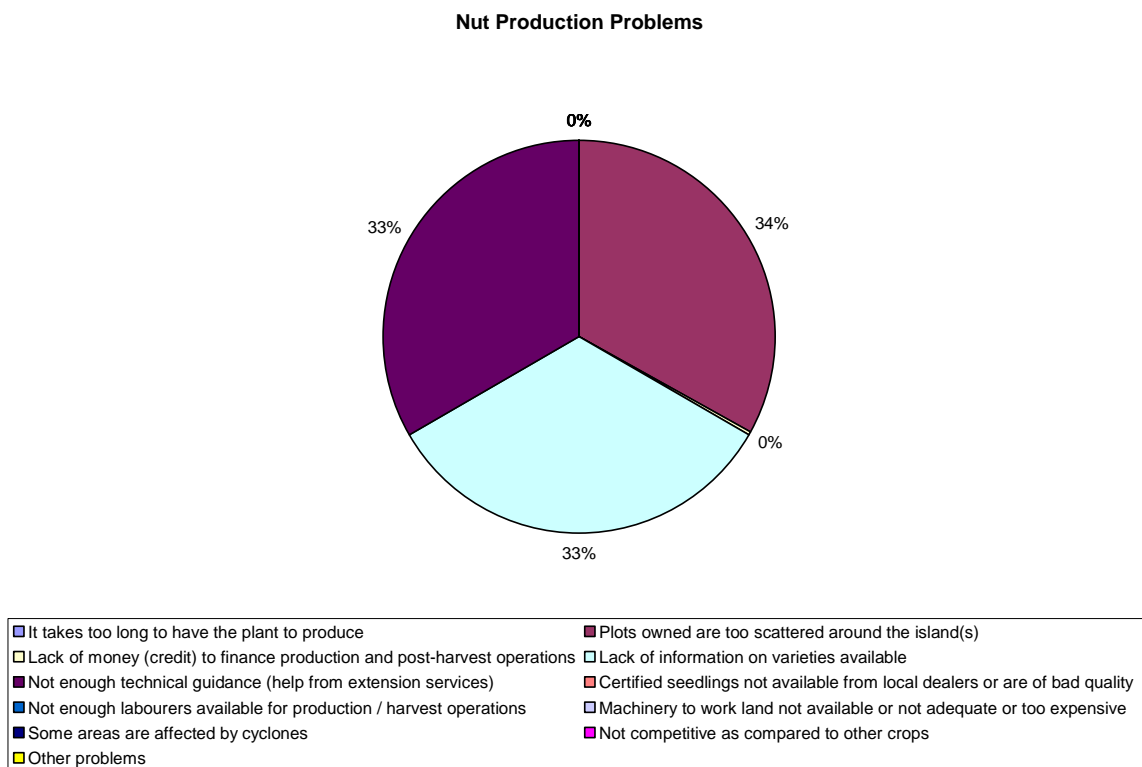
Table 5: Constraints to nut production and their relevance

Problem	Highly Relevant	Relevant	Not Relevant
It takes too long to have the plant to produce	0	0	0
Plots owned are too scattered around the island(s)	131	1	0
Lack of money (credit) to finance production and post-harvest operations	1	131	0
Lack of information on varieties available	132	0	0
Not enough technical guidance (help from extension services)	132	0	0
Certified plantlets not available from local dealers or are of bad quality	0	132	0
Not enough labourers available for production / harvest operations	0	0	132
Machinery to work land not available or not adequate or too expensive	0	0	132
Some areas are affected by cyclones	0	1	131
Not competitive as compared to other crops	0	131	0
Other problems	0	0	0

Of all farmers interviewed, 33% reported scattered plots as being the main constraint to generating sufficient quantity of supply and reducing production costs. It should be highlighted that nangai cultivation in Vanuatu was never a specialized way of farming; therefore, nangai trees have been grown either on fallowed farmlands, old settlements, and existing coconut plantations or used as windbreaks. A similar percentage of farmers identified lack of technical support –either in the form of technical guidance in general or specific in terms of varieties available- as another main constraint deserving due attention and correction if nangai production wants to be increased in Vanuatu. Lack of specific credit lines, certified plantlets and competitiveness as compared to other crops are also seen as constraints deserving adequate attention.

The chart below summarizes which have been the most relevant shortcomings highlighted through the investigations.

Figure 4: Chart showing nut production problems (highly relevant ones only)



8.2.3 Production and post-harvest supporting services

None of the farmers investigated procures money from banks or uses any formal credit line to meet his/her needs relating to the growing of the crop and the marketing of the harvested nuts. All farmers investigated, in fact, stated they were self-financing. The fact that no formal credit sources are accessed by nangai nut growers might be due to the lack of specific credit lines for this product. In addition, this business would not be particularly attractive for the local banking community because of the communal ownership of a large number of the trees grown in investigated areas (see comments at point 7.2 above). This latter factor would also complicate and limit the attraction of any investment by a single producer when, in fact, the whole community (or “extended family”) would benefit from the sale of harvests.

None of the farmers interviewed stated they were making use of technical assistance of any kind (meaning provided by government or private sector or buyers etc.) to grow and/or harvest their nangai nuts. In addition, the lack of technical assistance in general or on specific themes (such as help in selecting the right species or procuring certified plantlets) was also mentioned as a key constraint in developing this industry. This is probably the result of the total lack of specific technical assistance throughout the producing areas in Vanuatu available to assist growers or growing communities in meeting their production, post-harvest and marketing needs.

9. Conclusions and the way forward

9.1 Main conclusions

The conclusions of this report are based on the outcomes of the analyses of the existing secondary information on the nangai industry and of the survey implemented in selected nangai growing areas on (mainly) the Maewo, Ambae, Santo and Malakula islands.

On the whole, the survey showed that the identified constraints are universal, regardless of which island is under consideration and that the existing challenges reflect Vanuatu's structural deficiencies in transport infrastructure, communication – including market information systems – and effective organization and functioning of market channels. In addition there is also no viable government enabling policy in place to support the expansion of an industry which appears to have good market potentials both within and outside national boundaries. This in turn means there is a lack of technical support for the development of any agricultural-based industry.

In summary, the main conclusions which can be derived from the chain study conducted in Vanuatu can be summarized as it follows:

- 1) *Supply shortages appear to be the major impediment to the industry growth, rather than lack of demand.* As already highlighted by previous studies (McGregor, 1999 and Leakey, 2005), sufficient volumes of suitable quality product are available neither to meet the current domestic demand for raw or processed nut products, nor to sustain its widely reported growth potentials. This is also the lesson that can be drawn from the failure of the many efforts that the *Kava Store*, the largest (private) buyer of nangai in Vanuatu, has been implementing since 1989 to secure consistent flows of raw materials supplies from main production areas to meet its market demand;
- 2) *Existing marketing systems do not appear to be functioning as required.* This has emerged as being one of the major constraints to the development of this industry and as the main cause for the supply shortages mentioned above. There seem to be several reasons for the malfunctioning of nangai nut marketing systems:
 - i) Deficiencies in national transport infrastructure, which do not allow harvested crops to reach, in a timely and effective manner, the final markets – especially those in Port Vila, which hold the largest and most remunerative market potentials. These deficiencies concern both routes served, travelling schedules implemented, trade infrastructure offered and cost of the services proposed;
 - ii) Lack of intermediaries within the chain to share the risks of the business and to provide those services distinctive of this category of operators – such as: transmission of market information, advance of financial resources to face production and harvesting needs, provision and/or arrangement of transport services, procurement of new purchasers on final markets etc;
 - iii) Shortage of post-harvest equipment and infrastructure (such as freezing equipment to store kernels after they are cracked) for allowing the marketing of the harvests to be timed and adjusted to transporters' schedules and buyers' needs;

- iv) Lack of market outlets to allow producers to increase the frequency and the consistency of their harvesting operations and to actually sell their outputs to buyers. Furthermore, the existence of physical markets stimulates the formation and operation of traders/middlemen, who are key actors in assuring consistency of supply flows toward final markets/buyers;
 - v) Shortages of market information along with the technical extension support and the necessary infrastructure to ensure that information reaches the farmers. A lot of farmers become victims of distorted information when word-of-mouth gets passed on by too many people, as they do not have the capacity to verify that information. Often farmers' expectations do not reflect the real market scenario and they become too ambitious;
 - vi) Unsatisfactory organization of the farming community, which is mainly responsible for assuring (quality and quantity) consistency of raw materials' supplies and their adequate cracking, along with the grading, drying and storage of the kernels before they are sold to purchasers. A firm and well-organized farming community in production areas would, in fact, constitute a primary stimulus for private operators – such as Mr. Charles Long Wah of the *Kava Store* – to invest time and financial resources in trying to organize steady supply flows towards their processing and distribution centres;
 - vii) Cultural factors, which appear to be controlling the trade of supplies so they respond to particular community needs rather than to demand requirements²³;
- 3) *The size of the resource base is limited* –This is the finite numbers of wild indigenous nut trees available for harvest. This is often reported as being another cause of supply shortages for nangai. No exact statistics is available on the current stock of nut trees available for harvest throughout the country and on production potentials. However, if estimated tree stock (300,000 units) and production potentials (15,000 tonnes of nut-in-shell) would turn out to be realistic estimates, the kernel supply (from 2000 to 2500 tonnes of kernels) that would potentially be available every year could be more than enough to meet the existing domestic demand – along with its expected mid-term potential for growth – and to start targeting niches within external markets, such as the nut market in New Zealand;
- 4) *Technical support available to operators active along the whole chain is insufficient to assure a sustainable growth of this industry*. This has been clearly highlighted by the investigation. Farmers indeed lament a general lack of support in terms of selection of best species/varieties²⁴; of facilities capable to provide growers with certified planting materials; of advice on good agricultural practices and best post-harvest technology and on how best to orientate their marketing activities. However, it is also fair to acknowledge the input from the private sector (Mr. Charles Long Wah) in this direction over the last twenty five years despite the fact that the expected results were not

²³ Licht, 2004, reports that in the late 1990's farmers in Maewo supplied 7 tons of nuts for a return of 1,5 million VT (about US\$ 13,950). This arrangement continued for a period of 5 years to be then discontinued as the farmers concerned said they had received enough money to pay for kerosene and lanterns.

²⁴ Efforts to make available nut planting material based on desirable economic characteristics are mentioned in the existing literature. Among them the one implemented by CIRAD which, however, could not sort the desired effects (1999).

achieved²⁵. In order, therefore, to have the technical assistance required to ensure the correct response from producing communities it is also necessary that the communities themselves adopt a more entrepreneurial, active approach to the exploitation of this natural resource and that a higher organization of these communities be achieved – through the creation of producers’ organizations, functioning either on a formal or informal base. This is further supported by the results of several studies which have demonstrated the viability of commercial Nangai nuts enterprises at the smallholder level in Vanuatu (McGregor, 1999);

- 5) *Knowledge of quality management systems and certification systems is still largely not there.* As this investigation has shown, no recommended agricultural practice or post-harvest practice is followed in the production, harvesting and marketing of the nangai nuts. Although this probably does not interfere much with the domestic marketing of this nut, it would definitely have a negative impact on any export sale. Given the existing export potentials for nangai highlighted by the market investigations in two selected external markets, this kind of know-how must be quickly introduced to the farming communities. Furthermore, nangai nuts in Vanuatu are mostly grown under natural/organic production systems. Organic certification would be achievable with limited financial investments and would grant good returns in the case of sales on external markets – such as the one in New Zealand. The same could not be said however about the domestic market, where the organic status of the kernels and other nut products would grant very limited or even no returns from the investments necessary to attain this certification;
- 6) *The inconsistency of the domestic policies in supporting a sustainable development of the production, domestic marketing and export trade of this nut.* Domestic authorities have, in fact, been slow in recognizing the potential of forestry products – including nangai trees – and inconsistent in their efforts to support the development of this industry. Only in 2001, was the nangai tree recognized for its potential in both the timber and the high-value nut markets. However, archaic and ineffectual domestic legislation on land-use and ownership remain in place, and this curtails the commercial development of agricultural and forest areas;
- 7) *A committed and competent private sector involvement in nut marketing, processing and – though at a much lesser extent – production.* As repeatedly stated in this report, *The Kava Store* has been, in several ways and since 1989, actively involved in the development of this sector. Investments were made in motivating producing communities to harvest and trade larger amounts of nuts; in the distribution of inputs to growers; in the delivery of technical and market information; in the development of mechanical devices for processing the nuts, and of new products and packages to continuously differentiate the consumer’s market. Despite the uncertain results achieved as a result of all these efforts, it must be acknowledged that the interest shown by private operators in the development of this industry is extremely positive. Ways and means to take advantage from this efforts should be sought before the –though limited – effect/results so far accrued go wasted along with the advantage that Vanuatu still has over other Pacific Island Countries producing this specific nut.

²⁵ According to Mr. Charles Long Wah, faced with a severe shortage of supply, the *Kava Store* actively promoted the planting of nuts trees through radio messages, leaflets and by distributing seedlings throughout main producing areas of Vanuatu.

9.2 The way forward: a national strategy for the development of the industry

Besides using the results of the survey carried out in Vanuatu, the analyses of the existing literature and of other primary information collected with the chain study, the contents of this chapter also takes into consideration the outcomes of the two market investigations carried out by INEA on two external markets (New Zealand and Italy²⁶), which were selected based on their estimated import potential for tropical nuts. In particular, specific use of data and information gathered by these two latter research works is used for elaborating the section of the strategy related to the external (export) trade of Nangai – point 9.2.3 below.

The strategy presented here below is articulated along three points: a) actions recommended to benefit the nangai nut industry in general terms – having therefore an impact on the industry's performance on both the domestic and the export market; b) actions recommended to improve the industry overall performance on the domestic market; and c) actions recommended to tackle the potentials identified on new export markets.

9.2.1 Recommended actions benefiting the nangai nut industry in general terms

a) *Expand the available supply of this nut.* Both the analyses of existing literature and the outcomes of the chain study clearly identify this as being the main constraint to any desired, further development of this industry. The latter, in fact, does more depend on a larger quality supply of raw materials rather than an expansion of existing domestic demand or attainment of new demand on export markets. Enlargement of overall availability of nangai supplies should be sought through *ad hoc* policy measures targeting the establishment of effective services to support production (nurseries, technical assistance and credit) and marketing (post-harvest facilities and technology) of supplies and the proper use and ownership of land. Efforts should try and primarily involve the private sector for either establishing new commercial plantations where feasible or for better organizing the producing communities in traditional production areas (via the creation of formal and/or informal organizations). In particular, while no effort should be spared in trying to motivate and support producing communities in traditional production areas to increase the consistency and the frequency of their deliveries, the establishment of new plantations is advised to focus on physical areas as close as possible to main consumption centres on Efate. This would significantly help in by-passing the existing huge constraints related to the inter-island transport of goods – including of nangai supplies.

However, urgent measures need to be domestically implemented to improve the quality and uniformity of the final nuts products (nut-in-shell and kernels) through domestication of the species as a crop so that plantings can be made with selected cultivars, such as has occurred with indigenous fruits and nuts elsewhere in the tropics (Leakey, 2006). This task can be met by research undertaken with local farmers to domesticate the species through germplasm prospection, vegetative propagation,

²⁶ These two market investigations are separately presented with volume 2 (“Outcomes of the market investigations implemented in New Zealand and Italy”) of this chain study.

phenotypic selection and cultivar dissemination. This would eventually contribute to ensure not only produce of a higher quality, but also consistency and reliability of supplies from producers. Given the interest shown for this by households in the rural community – as also shown by this investigation and according to very recent studies (Leakey *et al.*, 2003 and Tchoundjeu *et al.*, 2006) – there is a great potential for this domestication programme to follow the procedures of participatory domestication. In this case, farmers would be taught how to propagate the elite trees in their villages using simple vegetative propagation techniques (Leakey *et al.*, 1990), so producing cultivars with large, easily-extracted kernels with desirable nutritional qualities, across a wide production season and according to well established market targets (Leakey and Page, 2006);

b) Rationalize the existing marketing system for this nut. Besides supporting existing private growers and growing communities in their effort to produce, harvest and market larger and better quality supplies, it is essential that new operators enter this business if the industry has to expand. Considerable efforts have already been made towards this by few, private pioneers (such as the managers of *The Kava Store*, *The South Pacific Nuts* and *The Lapita Café*). However, more are required. To this end, a quite useful contribution could be provided by the involvement of private transporters – acting as middlemen – into this business. These operators could, in fact, be of considerable help in assuring more frequent and reliable transport connections from traditional production areas – in islands in the northern and central regions of the country – to consumption centres in Efate. The feasibility of establishing linkages among (adequately organized) producing communities, transport operators and final purchasers (in Efate) should be assessed by introducing the topic to pre-selected operators and by jointly estimating the returns that could be reasonably expected from this joint effort;

c) Improve the quality of supplies. Along with scarce quantities harvested and being channelled to the final consumption centres, and the consistency of supply flows, the overall quality and maintaining consistency in quality of supplies is seen as another major constraint in building up a sustainable nangai industry in Vanuatu. As a matter of fact, from the cracking of the raw nut and to the storage and transport to final destinations of the kernels, it is extremely difficult to guarantee quality and consistency of quality in the supply flows when having to deal with raw materials sourced from different species (therefore, with a different genetic basis) and ecological environments that have not undergone a standardised methodology for determining and maintaining the fruit quality – in terms of selection, grading, packaging and transport etc. Standardised methodologies for assessing the quality of nuts-in-shell and of their derivatives (kernels) should be worked out jointly with final buyers and made known to producers through capacity building exercises and materials – hands-on training, field days, workshops, preparation of leaflets, radio communicates etc. Vanuatu could gain significantly by looking at how other countries, such as Papua New Guinea and Solomon Islands, have addressed this issue. In the same way, information based on recommended production and post-harvest practices should be more consistently widespread using the capacity building means and materials mentioned above.

9.2.2 Actions recommended to improve industry's performance within the domestic market

a) *Look at the internal market as a priority market for the development of the domestic nangai industry.* As all investigations so far implemented in Vanuatu on the nangai industry have clearly shown, the domestic market of this nut is under-supplied. There are, in fact, segments of the domestic nangai nut market where demand is unanimously reported (by local operators) not to have been satisfied or even tackled as yet. Besides just the need to exploit this potential, targeting of the domestic market in order to drive the future growth of this industry is justified also by two other reasons: i) the lower request for quality among domestic consumers as compared to the one from operators/consumers on external markets; and ii) the relatively rewarding prices paid for this nut and its derivatives on the domestic market.

As the contents of the market investigations included in Volume 2 highlight and emphasize, the quality requirements (in terms of: produce grading, enforcement of quality management systems throughout the whole production and marketing phases, controls on the level of internal fruit contaminants etc) of external markets are far more stringent than those enforced for the products sold on the domestic market. The enforcement of the quality standards and controls requested by external buyers would impose on Vanuatu operators (additional) investment and operational costs and a level of management and control of the activities all along the nut chain which do not appear to be sustainable in the light of the current status of facts within this industry.

Furthermore, as a comparison of the prices fetched on the domestic market with those that could be (at least at the beginning) fetched on external markets (particularly in New Zealand, where an export operation of nangai nuts from Vanuatu looks more feasible and sustainable) shows, the level of prices paid for the dry nut-in-testa (dry kernels) and, even more, for its processed derivatives on internal markets of Vanuatu can be estimated as quite rewarding for domestic market operators;

b) *Develop those segments of the domestic market where unmet demand potentials still exist.* As said above, local operators estimate the existence of pockets of demand still unmet within domestic market segments where they already operate, along with new demand within market segments that have not been tackled yet.

According to local operators, pockets of demand still largely unmet exist within that domestic market segment responsible for nangai products for the tourists. This latter demand usually relates to products made out of quality kernels (usually coated in sugar or honey or simply roasted and salted), gracefully packaged into plastic/glass jars or plastic packets and sold via those outlets where tourists usually drop in – such as: supermarkets, tourist shops or specialised shops (as the *Kava Store*). The same “unmet demand” can be found amongst domestic consumers with a good to high spending capacity and who look for goods similar to those targeted by the tourists. Similarly, there is also an unmet demand within those domestic consumers with a middle to low spending capacity (including also school pupils, who snack often) and who purchase nut products produced out of lower grade kernels (typically broken or darker kernels), usually roasted and salted or coated in

sugar, packed in simple plastic packets (usually of 20 to 100 gm) with no or very limited branding and retailed through traditional stores and nakamals.

As for the segments estimated to hold still an unexplored market potential, the following could be mentioned: hotels (which could propose, for sale, ready-to-go packages made up of a set of packets of nuts differently processed and to be carried home as a gift), restaurants (adding nangai as an ingredient of traditional or innovative dishes) and regional airlines (offering snacks based on/including nangai during domestic and/or regional/international flights);

c) Take all needed measures to assure that still existing potentials on the domestic market can be met by local operators. It is obvious that the fulfilment of the potentials described at point a) and b) here above would require the implementation of the recommendations previously described at point 9.2.1.

9.2.3 Actions recommended to start export operations on external markets

Comments included into this section are derived from the contents of the two market studies implemented in New Zealand and Italy in parallel with the implementation of chain study works in Vanuatu. The contents of the two studies are separately and extensively presented within Volume 2 of this chain study (“Outcomes of the market investigations implemented in New Zealand and Italy”). Therefore, contents of this section 9.2.3 are just a very brief summary of the analyses, concepts and ideas presented in full detail within Volume 2.

a) Export markets should be targeted only after unmet demand on the domestic market is fully or extensively met. For what is stated at point 9.2.2 above, the venturing of external markets – especially those located in developed countries – would require a level of organization, an overall control and management of the whole chain (from production to final delivery of goods to the operator in the importing country) and investments which far exceeds the current capabilities of domestic operators in Vanuatu. If any export business targeted towards the two investigated markets will be pursued in the coming future, it will have to be carried out very progressively, so as to minimize risks and to capitalize from mistakes that often occur when running businesses in new environments and with new operators.

b) Going alone or with a local partner? With reference to both external markets investigated with the chain study, a direct import – by a Vanuatu operator – of nangai nuts into either the New Zealand or Italian horticultural markets is not recommended as it would not prove to be a long-term sustainable business. The same can be said for a direct distribution of final (raw or processed) products within the two investigated countries (New Zealand and Italy). As a newcomer, in fact, the Vanuatu operator would be at a disadvantage having to compete with well established local operators already benefiting from experience accrued with the sale of other nuts/nuts’ products, such as contacts/linkages already in place, the scale of their current operations and the quality of logistics/distribution services they are capable to provide to their customers (no

matter which nuts' market segment these fall in). Any import trade of nangai nuts from Vanuatu, therefore, would have to be channelled through a local operator. As for the choice of the operator to work with – an importer or an agent – and the form of partnership to establish with him, this will largely depend on the product traded and the size of supplies available in Vanuatu, as it will be explained at point c) here below;

- c) *With what product?* In general terms, products recommended for trade with New Zealand are different from those recommended for trade with Italy. The product to be traded with New Zealand would have to be a dried, raw (natural, which means: not roasted, salted or otherwise coated) kernel. For this kind of kernels, preliminary assessments by New Zealand operators indicate a quite wide range of potential uses, though this will have to be confirmed by market and consumer tests which are a compulsory pre-requisite for any product entering a new market. In the light of this, the choice of the New Zealand operator to use for venturing this market is recommended to be one with a clear potential for operating on several segments – also at the same time – and willing to start with limited amounts (as the ones most likely to be made available from Vanuatu). The selection would therefore focus on major operators, such as Prolife Foods Ltd and Davis Trading Ltd, who have shown great interest in the nut and said to be prepared to run all needed market tests at their own expenses. Selling to one of them, as an exclusive purchaser/partner for the New Zealand market, could also guarantee that all grades (whole, however broken and ground product) find an adequate use – although it has to be expected that preference would be given for the whole kernel, especially in the case of Prolife Foods Ltd, leader in the loose segment. To operate with any of these two large importers would, however, require that a minimum supply of quality kernel of 2 tonnes/year be made available, and this quantity can be expected to grow sharply as the product gets known by consumers, especially if destined to be sold through bins or as a snack. In case only volumes below the 2 tonnes/year could be made available from Vanuatu, operators within the “healthy foods” and/or organic segment (such as: Ceres Enterprises Ltd or Lindtrom Foods Ltd) would be better targeted. Sales to a New Zealand buyer of organic foods would, however, require nangai kernels to be certified as organic by a certifying company recognized in New Zealand.

As for the Italian market, a roasted, unsalted kernel would be the product of primary interest for targeting mostly the snack market. In contrast to the New Zealand nuts' market, the Italian market is already mature, presenting the highest demand potentials within the snack segment. Medium-size wholesalers (such as: Borgnino Italia Ltd, Turin, and Natale Galeazzo Ltd, Padua), based within main horticultural Italian wholesale markets, and operating as importers with a well established network of clients representing multi-purpose retailers and/or traditional retail shops would be the operators recommended as those to work with in the Italian market. . On the whole, the volumes required to start the trade business are expected to be much higher than in the case of New Zealand. This is due to the large size of the Italian nuts' market compared to the New Zealand market; a fact that imposes much larger transactions if the whole market wants to be reached by the new product.

In the light of this and of the still very limited amounts of kernels reaching potential exporters in Port Vila, it is strongly advised that any export action be undertaken first with New Zealand rather than Italy. This latter country, however, could become an interesting market to be targeted – given also the higher prices than those achievable in New Zealand – should a large enough kernel supply becomes available in any near future;

- d) *With what packaging and label?* In the case of both markets, it is required that kernels are exported loose inside plastic, vacuum-packed bags of 5 (in Italy) to 10-12 (in New Zealand) kg/each, to be transported inside corrugated cartons. Whilst, with very few exceptions, no interest was shown in New Zealand for the importation of a retail-ready kind of product, operators on the Italian market showed a keener interest in having final snacks produced and packed in Vanuatu should the conditions exist for carrying this out according to quality and health clients' requirements. All lots are expected to come in properly stacked pallets. Labelling requirements should be those expected under the Australia/NZ Food Standard Code or the EU Commission legislation. Strict observance of hygienic/sanitary principles would be a “sine qua non” condition to operate any business between Vanuatu and both New Zealand and Italy;
- e) *At what price?* It can be reasonably expected that before there is demand for a new product – as nangai would be realized in either the New Zealand or the Italian nuts' markets – some time will have to elapse. In addition, the need for a local intermediary to operate on these two external markets means that the price for nangai must be initially competitive with the prices of similar products – thus allowing the nangai to replace them.

Given this and preliminary estimates of transport and local packaging costs, it is anticipated that a CIF price between US\$ 5.5/kg and US\$ 6.0/kg could be, most likely, the quotation at which the nut could be proposed on the New Zealand market –taking also into consideration the absence of competition from other suppliers and the fact that the product would be a “novelty” for this market. As for the Italian market, a CIF price between US\$ 10/kg and US\$ 12/kg could instead be fetched. This is the current import price of a nut (*Macadamia*) which is seen as having similar market features to the nangai nut.

However, it can be reasonably expected that higher quotations could be fetched in both markets with sales to the “organic/health foods” segment, especially in the case of a product which is certified organic. The overall demand and the growth potential in the future within this segment would, however, be limited and not comparable with those that could eventually be achieved within the other market segments illustrated above.

ANNEXES

ANNEX 1

Questionnaires used for the survey

GTFS/RAS/198/ITA PROJECT
SUPPORT TO THE REGIONAL PROGRAMME FOR FOOD SECURITY IN PICs

Survey of producers of Nangai nuts - Vanuatu

A) The enterprise

Q.1 Kind of enterprise

- Private
 Cooperative
 Other (Specify:

Q.2 Size of the farm/production area

Land owned (Ha)	Land rented (Ha)	Other land (Ha)	Total size (Ha)

Q.3 Is your farm made up just by one plot or by several plots?

- One
 Several (*How many?* :

Q.4 Information on the family members involved in the enterprise activities

Items	Operator	Spouse	Son/ Daughter				Other family member	
<i>Sex (M / F)</i>								
<i>Age</i>								
<i>Level of instruction</i>	XXXX	XXXX	XXXXX	XXXXX	XXXXXXX			
Primary								
Secondary								
University								
Other								
<i>Employment</i>	XXXX	XXXX	XXXXX	XXXXX	XXXXXXX			
Exclusively employed in the farm								
Partially employed in the farm								
Other (<i>Specify inside the column</i>)								

Q.5 Overall production picture for the farm: areas harvested and production obtained over last production season for products other than nuts (up to 4)

Product (Specify)	Total area harvested (Ha)	Harvested production (MT)
Open Field		
Under cover (Greenhouse)		
Total		

B) Production

Q.6 Are nuts traditionally grown in the village/district where you live?

- Yes
 No

Q.7 Since when do you grow Nangai nuts in your farm? Since.....

Q.8 Who owns the Nangai trees that you harvest?

- Myself My family Local community

Q.9 Which are the main varieties of nuts that you grow in your village/district?

.....

Q.10 What was the number of trees grown and those harvested over the 2005 season?

<i>Number of trees grown</i>	<i>Number of trees harvested</i>

Q.11 Quantity of nuts harvested and its utilization over the 2005 season

<i>Harvested production (kg)</i>	<i>Family Consumption (kg)</i>	<i>Reused as seeds (kg)</i>	<i>Wages in kind (kg)</i>	<i>Barter trade/gifts (kg)</i>	<i>Sales (kg)</i>

Q.12 When are nuts harvested in your district/village?

- The whole year round
 Only on season (*From:..... to:*)

Q.13 Which is the prevailing harvesting practice?

- Manual
 Half-mechanised
 Fully mechanised

Q.14 Which of the recommended production and harvesting practices below are used in your farm?

- Correct use of pest management practices
 Use of recommended seeds
 Use of recommended fertilizers and soil amendments
 Due recording of production practices
 Irrigation system with low environmental impact
 Correct disposal of farm waste
 Other (Detail:)

 None

If the answer to question 14 was "None", go straight to question 17.

Q.15 Who, among your clients, requires you to use these recommended practices (*Detail:*)

Q.16 How do you keep yourself up-to-date about these practices? Do you have someone to help you with this? (Extension people, private sector etc?) (*Detail:*)

C) Post-harvest

Q.17 Which post-harvest infrastructure do you have in your enterprise? What's its capacity?

<i>Facility</i>	<i>Warehouse/depot</i>	<i>Drying facility</i>	<i>Transport Fleet</i>	<i>Other facilities/equipment</i>
	<i>sqmt</i>	<i>sqmt or MT</i>	<i>MT</i>	<i>sqmt or MT</i>
Capacity				

Q.18 How do you take nuts to the selling place? (*Provide % of total volumes sold*)

Transport arrangement used	%
◆ Through my own transport	
◆ Through private transporters	
◆ Using public transport	
◆ The buyer picks it up from my farm or he arranges the transport otherwise	
	100 %

Q.19 What is the average distance you travel to sell your nuts?Km

Q.20 Specify how do you sell your nuts (*Detail % of total volume sold via the various channels*)

<i>Selling practice</i>	<i>%</i>
<i>Through intermediaries</i>	
To "intermediaries" when the production is still in the field/on the tree	
Through wholesalers in village/town markets	
Through retailers in village/town markets	
<i>Direct sales</i>	
Sell directly in my farm/In front of my house/On the road side	
Sell directly in village/town markets (himself or family members)	
Sell directly to supermarkets (through contracts)	
Sell directly to hotels and/or restaurants	
Other (Specify:)	
	100%

Q.21 Which of the following post-harvest operations do you usually carry out?

1. Removing the flesh
2. Drying (husked nut or kernels)
3. Cracking/shelling the dried nut
4. Grading of the kernel
5. Removal of testa from kernel
6. Packing of the kernels
7. String the kernels

If a positive answer was given to question 21/4 proceed with question 22. Otherwise, move to question 23.

Q.22 Which standards or not-standardised criteria do you use for grading nuts after harvest?

- International Standards (*Specify:*)
- National Standard (from Vanuatu Bureau of Standards)
- Buyer criteria (*Who are these buyers?*)
- My own criteria

Q.23 In case your own or buyer's criteria are used, which are them? (1 to 4, with 1=most important)

- Size of nut-in-shell
- Weight of nut-in-shell
- Kernel mass to nut-in-shell mass ratio
- Other:

Q.24 Where is the grading carried out?

- At harvest site
- At collection point
- Other (*Specify:*)

Q.25 Do you pack the nuts prior to their sale?

- Yes
- No, I sell them bulk.

If answer to question 25 was "Yes", proceed with question 26. Otherwise, move to question 30.

Q.26 Provide details on the kind of packing used:

<i>Package</i>	
<i>Kind of packing</i>	<i>Weight of the package (Kgs)</i>
Plastic bags to pack nuts-in-shell in bulk	
Plastic bags to sell kernels in bulk	
Other (<i>Specify:</i>)	

Q.27 Where is the packing carried out?

- At harvest site
- At farm level
- Other (*Specify:*)

Q.28 Are packing materials easily available?

- Yes
- No (*Explain why not:*)

- Follow recommendations of extension staff
- Follow recommendations of neighbours or friends
- My personal choice
- Other (Specify:)

Q.36 Who participates in the production, post-harvest and marketing activities in your enterprise?

<i>Operation</i>	<i>Husband</i>	<i>Wife</i>	<i>Son/ Daughter(s)</i>	<i>Non-family labourers</i>
<i>Production practices</i>				
<i>Harvesting</i>				
<i>Grading of produce and packing</i>				
<i>Transport of produce to selling place</i>				
<i>Selling the product</i>				

Problems

Q.37 Could you rank the main problems related to nuts production?

<i>Problem</i>	<i>Problem</i>		
	<i>Highly relevant</i>	<i>Relevant</i>	<i>Not relevant</i>
• It takes too long to have the plant to produce			
• Plots owned are too scattered around the island(s)			
• Lack of money (credit) to finance production and post-harvest operations			
• Lack of information on varieties available			
• Not enough technical guidance (help from extension services)			
• Certified plantlets not available from local dealers or are of bad quality			
• Not enough labourers available for production/harvest operations			
• Machinery to work land not available or not adequate or too expensive			
• Some areas are affected by cyclones			
• Not competitive as compared to other crops			
• Other (<i>Specify</i>):			
.....			

Q.38 What should be done, in your opinion, to overcome these problems?

.....

.....

.....

Q.39 Which are, in your opinion, the main problems related to the marketing of nuts?

<i>Problem</i>	<i>Tick</i>
• Lack of market information (prices, supply assessments, market reports and trends etc)	
• Lack of transport means or transport means too expensive	
• Final markets too far away from production areas	
• Poor transport infrastructure (roads to markets)	
• Levels of supply not consistent (changes too much between seasons)	

• Quality of production not meeting the final demand	
• Adequate post-harvest (cracking) technology not available or too expensive	
• Shipping routes to move products from one island to another not adequate	
• Nutritional value not known or not promoted locally	
• Other (<i>Specify</i>):	
.....	
.....	

Q.40 What should be done, in your opinion, to overcome these marketing problems?

.....

.....

.....

.....

.....

Other

E.1 CERTIFICATION SCHEMES

Q.41 Under which technology do you currently produce nuts? (*Tick accordingly*)

<i>Kind of production</i>	<i>Traditional</i>	<i>IPM</i>	<i>Organic</i>	<i>Under transition to organic</i>
<i>Nuts</i>				

Q.42 Which of the following certifications do you use?

- Organic
- Fair Trade
- EUREP-GAP
- Other (*Explain:*

.....) None

If the answer to question 42 was “None”, proceed to question 45. Otherwise, move to question 43.

Q.43 Are certification agents (including for organic production) easily available in Vanuatu?

- Yes
- No (*Explain:*

.....)

Q.44 How much certification weights on total production cost? (*Give an estimated %:*)

E.2 FINANCING

Q.45 How do you finance your activities? (*Specify percentage on total financial needs*)

Form of financing	%
Self-financing	
Borrowing from other members of the family/friends	
Credit from buyers (Specify which buyer:)	
Credit from banks	
Grants from government	
Micro-credit schemes	

Q.46 Which kind of credit do you mostly need for your nuts production?

- Long term: (*Specify length:*)
- Short term: (*Specify length :.....*)

Q.47 Are you borrowing any credit for growing nuts?

- Yes, credit from lines specifically conceived for Nangai nuts
- Yes, credit from generic lines available for the agricultural sector
- Not at all

If the answer to question 47 was “Not at all”, move to question 49. Otherwise, proceed with question 48.

Q.48 Which are the conditions of the lines you use? (*In terms of: interest rates (for long or short credit), collaterals, holyday periods etc*)

.....

E.3 EXTENSION SERVICES

Q.49 Do you use any external technical assistance to grow your nuts?

- Yes (*Detail on which specific matter assistance is provided:*
 (.....
)
- No

If the answer to question 49 was “No”, stop here the interview. Otherwise, move to question 50.

Q.50 If yes, who provides it?

- Domestic institutions for free
- Buyers for free
- Buy from private sector (private consultants etc)
- Farmers’ exchange
- NGOs and civil society
- Other (*Specify:.....*)

Q.51 How would you rate the quality of the technical assistance you receive to grow your nuts?

- Very good (*Specify for which provider:*)
- Acceptable (*Specify for which provider:*)
- Poor (*Specify for which provider:*)

PRODUCER'S DETAILS

Producer Name : Address :
.....

OTHER INFORMATION

Name of surveyor:	Place of the interview:
Date of interview:	Progressive number of interview:

**GTFS/RAS/198/ITA PROJECT
SUPPORT TO THE REGIONAL PROGRAMME FOR FOOD SECURITY IN PICs**

Survey of processors/exporters of Nangai nuts - Vanuatu

GENERALITIES

- Q.1** Since when have you been in this business? (*Specify year:*)
- Q.2** Which kind of processed products do you produce out of Nangai nuts? Could you indicate the volumes produced and those exported during 2005?

Kind of product	Amount produced in 2005 (MT)	Amount exported in 2005 (MT)
<i>Nuts-in-shell</i>	XXXXXXXXXXXXXXXXXXXX	
<i>Dehydrated (dried) kernels as such</i>		
<i>Salted kernels</i>		
<i>Roasted kernels</i>		
<i>Oil</i>		
<i>Other</i> (<i>Specify:</i>)		

- Q.3** Which country is importing your nuts/kernels? How many buyers did you have in these foreign countries during 2005?

<i>Product exported</i>	Importing country/ies	Number of buyers
<i>Nuts-in-shell</i>		
<i>Dehydrated (dried) kernels as such</i>		
<i>Salted kernels</i>		
<i>Roasted kernels</i>		
<i>Oil</i>		
<i>Other (Specify:</i>)		

- Q.4** Do you also sell on the domestic (Vanuatu) market?
 Yes
 No
- Q.5** Besides nuts/kernels, which other agricultural product / foodstuff do you process or export?

PRODUCE PROCUREMENT

- Q.6** What and how much do you buy from your suppliers?
 (*Specify % over the total of 2005 purchases*)

<i>Kind of product</i>	%	<i>Amount purchased (MT or bags)</i>
• Nuts-in-shell (dried)		
• Nuts-in-shell (not dried)		
• Kernels-in-testa only		
	100%	

Q.7 How do you procure the nuts/kernels?
(Estimate % on total amounts procured based on 2005 purchases)

<i>Form of procurement</i>	<i>%</i>
• <i>Own production</i>	
• <i>Directly from producers in the countryside</i>	
• <i>From producers delivering at my enterprise premises</i>	
• <i>From middlemen in the countryside</i>	
• <i>From middlemen inside urban markets or based in urban centres</i>	
• <i>Other (Specify:)</i>	
	100%

Q.8 Do you use any form of contract farming?
 Yes (Specify:)
 No

Q.9 Which forms of transport do you use to procure nuts?
 Use my own transport
 Use hired transport (boats and/or plains and/or trucks)
 Producers take the product to my premises
 Other (Specify:)

Q.10 How do you receive/buy the nuts from your suppliers?
 Bulk in bags (Specify average weight/bag:Kg)
 Other (Specify kind and average weight/bag:)

Q.11 When do you pay your suppliers of nuts?
 Pre-payment (specify % of total purchase value:%)
 On delivery
 At the next delivery
 Withindays from delivery

Q.12 Do you provide any form of support to your suppliers of nuts/kernels?
 Yes, pre-harvest credit
 Yes, give them seedlings, planting materials and/or technical support (know-how etc)
 Yes, other (Specify:.....)
 Not at all

Q.13 Do you require your providers of Nangai nuts to use recommended production and harvesting practices or to sort from producers who are using them?
 Yes (Specify what are the most important requested practices:
.....
.....)
No

Q.14 Which are the main constraints you have experienced in Vanuatu in procuring nuts?

Constraint	Tick
<i>a. Production is not enough to meet export demand</i>	
<i>b. Supply is not consistent in quantity terms</i>	
<i>c. Produce quality is not satisfactory and/or is inconsistent</i>	
<i>d. Lack of post-harvest facilities (cold stores) with farmers to store cracked nuts</i>	
<i>e. Prices on the domestic market are more lucrative, thus discouraging domestic producers to sell the nuts/kernels to exporters</i>	
<i>f. Cost of cracking too high to allow a sizeable supply of kernels</i>	
<i>g. Variable sizes of nuts</i>	
<i>Other (Explain:)</i>	

Q.15 What solutions do you propose to overcome the above constraints?

.....

POST-HARVEST OPERATIONS

Q.16 Are the nuts/kernels graded before being exported?

- Yes, both nuts-in-shell and kernels
- Yes, only kernels
- No, neither nuts nor kernels

If the answer to question 16 was no, move to question 21. Otherwise, continue with question 17.

Q.17 Who is grading the nuts or the kernels?

- Producers before delivery
- Trader/Middleman before delivery (Specify:)
- Myself (The exporter)

Q.18 Which are the criteria used for the grading?

- International standards are used (Specify:)
- Importer's standard are used (Specify:)
- National (Vanuatu) standard is used
- I use my own criteria based on:
 - Size
 - Nut/kernel ratio
 - Other (Specify:

Q.19 Besides grading, what other post-harvest operation do you carry out in your enterprise?

- Storage of nuts-in-shell (Specify length of storage –number of months:)
- Cracking of nuts
- Blanching (testa removal from kernels)
- Dehydration of blanched kernels (Specify method:)
- Packing of blanched kernels
- Other (Specify:

Q.20 How are the various post-harvest operations carried out? (Tick according to operation)

<i>Post-harvest operation</i>	<i>Grading</i>	<i>Cracking</i>	<i>Blanching (testa removal)</i>	<i>Packing of kernels</i>
• <i>Fully manual</i>				
• <i>Half-mechanised</i>				
• <i>Fully mechanized</i>				

Q.21 Which facilities do you own for running your nuts business?

Facilities	Description
<i>Storage facilities (area /capacity)</i>	
<i>Cold stores (number & capacity)</i>	
<i>Selecting/Grading equipment (kind & capacity)</i>	
<i>Packing equipment</i>	
<i>Trucks (number & capacity)</i>	
<i>Other (Specify:)</i>	

Q. 22 From 100 Kg of nuts-in-shell, how much do you get of the various processed products that you produce?

Kind of processed product	Amount obtained (kgs)
<i>Dehydrated (dried) kernels</i>	
<i>Oil</i>	
<i>Other (Specify:)</i>	

Q.23 Which of the following GMPs you are using in your enterprise?

- Enforcement of due cleaning practices (of equipments, working surfaces, floors, other surfaces etc)
- Correct display and enforcement of working safety measures
- Enforcement of correct measures to assure adequate hygiene of staff
- Correct storing of packaging materials
- Other (Detail:)
- None

If the answer to question 23 was "None", go straight to question 26.

Q.24 Who, among your clients, requires you to use them? (Detail:

.....)

Q.25 How do you keep yourself up-to-date about them? Do you have someone to help you with this? (Extension people, private sector etc?) (Detail:

.....

.....)

THE MARKET

Q.26 Where and how much did you export in 2005? (Tick according to importing country - Specify amounts/MT)

Importing country	Product exported			
	Nuts-in-shell (dried) (MT)	Kernels as such (dried) MT	Coated kernels (MT)	Oil (litres)
<i>Australia</i>				
<i>New Zealand</i>				
<i>Japan</i>				
<i>Pacific region</i>				
<i>Other (Specify:.....)</i>				

Q.27 How do you export your products?

- Wholesale in bags (Specify weight of bags:.....kgs)
- Packed in retail units
- Other

Q.28 Kind of packaging (only in case of retail packages)

Kind of packaging	Weight
<i>Jar</i>	
<i>Plastic bag</i>	
<i>Plastic bag (vacuum packed)</i>	
<i>Aluminium foils</i>	
<i>Other (Specify:)</i>	

Q.29 Which are the requirements of your external buyers in terms of:

Kind of requirement	Description of requirements
<i>Packaging</i>	
<i>Labelling</i>	
<i>Phyto-sanitary measures</i>	
<i>Other:.....</i> <i>.....</i>	

Q.30 During the past 5 years, did you have any consignment rejected?

- Yes (Explain reason:
.....)
- No

Q.31 Do you have a traceability system from production to final market in place?

- Yes (*Describe:*
.....)
- No

Q.32 Who, abroad, is purchasing your nuts?

- The importer
- The final seller (supermarket, shop, processor etc)
- Other (Specify:.....)

Q.33 How do your customers abroad pay you?

- Advance payment (mention proportion over total value of payment:%)
- Pay on delivery
- Pay on next delivery
- Pay withindays

Q.34 Do you export your nuts as “organically produced”?

- Yes, the whole amount exported is labelled as “organically produced”
- Yes, but only a share of total exports (Specify type of buyer:.....)
- No (Explain why not:.....
.....)

Q.35 Do you export your nuts under any “Fair-trade” label?

- Yes (Specify type of buyer:.....)
- No

Q.36 Besides production constraints that you have already commented above, what else is currently limiting the development of your nuts' exports? (*Specify according to the step within the chain*)

<i>Step of the chain</i>		<i>Details on the constraint</i>
1.	<i>Harvest</i>	
2.	<i>Post-harvest: Selection/Grading</i>	
3.	<i>Post-harvest: Storage</i>	
4.	<i>Post-harvest: Packaging</i>	
5.	<i>Post-harvest: Labelling</i>	
6.	<i>Transport (within Vanuatu)</i>	
7.	<i>Transport (outside Vanuatu)</i>	
8.	<i>Phytosanitary measures in import markets</i>	
9.	<i>Final market</i>	
10.	<i>Other (Detail:.....)</i>	

Q.37 What solutions do you propose to overcome the above constraints?

.....

.....

.....

.....

.....

.....

DETAILS ON THE INTERVIEWED OPERATOR

Company :

Address :

Tel. & Fax No : **Email:**

OTHER INFORMATION

Name of surveyor:	Place of the interview:
Date of interview:	Progressive number of interview:

ANNEX 2

Main Bibliography

- 1) Leakey, R. B. Roger. 2005. “*Domestication and commercialization of Galip Nut-Feasibility Study*”. ACIAR Project FST/2002/010. Nari and James Cook University, Cairns, Australia.
- 2) [www.traditionaltree.org]
 - a) Evans, B.R. 1991. *A Variety Collection of Edible Nut Tree Crops in Solomon Islands*. Research Bulletin 8. Dodo Creek Research Station, Ministry of Agriculture and Lands, Honiara, Solomon Islands.
 - b) Evans, B.R. 1991. *The Agronomy of Ngali Nuts (Canarium spp.)*. Research Bulletin 9. Dodo Creek Research Station, Ministry of Agriculture and Lands, Honiara, Solomon Islands.
 - c) Evans, B.R. 1991. *The Production, Processing and Marketing of Ngali Nuts (Canarium spp.) in Solomon Islands*. Dodo Creek Research Station, Ministry of Agriculture and Lands, Honiara, Solomon Islands.
- a) Evans, B.R. 1994. *An economic, Social and Environmental Impact Assessment of the Introduction of a Mechanical Canarium nut Cracker in Vanuatu*. Pacmar, Inc., Honolulu.
- b) Evans, B.R. 1994. *Kandrian Gloucester Study West New Britain Province. Project Design and Management and Kandrian and Gloucester Integrated Development Project*, Canberra and Kimbe, Australia.
- c) Evans, B.R. 1994. *Marketing Galip Nut (Canarium spp.) in Kandrian and Gloucester Districts, West New Britain, Papua New Guinea*. Project Design and Management Pty Ltd, Canberra, Australia.
- 3) McGregor, A.M. 1999. *Land-use Profile: Tree Nuts*. AusAid Vanuatu Land Use Planning Project in cooperation with the Land Use Planning Office, Port Vila, Vanuatu.
- 4) Wissink, D. 1996. *Galip (Canarium indicum) as a cash crop in West New Britain, Papua New Guinea: experience of the Kandrian Gloucester Integrated Development Project*. In: Stevens, Bourke, and Evans, op. cit.
- 5) Thomson, L.A.J., and B.R. Evans. 2001. *Canarium indicum*. Species text file prepared for SPRIG Forest Genetic Resources Data Base, CSIRO Forestry and Forest Products, Canberra, Australia.
- 6) Commonwealth of Australia. 2006. *Pacific 2020: Challenges and Opportunities for Growth*. Australia.
- 7) Maima, M. 1994. *Processing of galip (Canarium indicum) in Papua New Guinea*. In: Stevens, Bourke, and Evans, op. cit.

- 8) Leakey, R.R.B., Tchoundjeu, Z., Schreckenberg, K., Shackleton, S. E. and Shackleton, C. M. 2005. *Agroforestry Tree Products (AFTPs): Targeting poverty reduction and enhanced livelihoods*. International Journal of Agricultural Sustainability 3 (1).
- 9) Leakey, R.R.B 2002. *The domestication of indigenous trees as the basis of a strategy for sustainable land use*. TWNSO Africa regional workshop, Muscat, Oman, 22-24 April 2002.
- 10) Schreckenberg, K., Awono, A., Degrande, A., Mbosso, C., Ndoye, O., and Tchoundjeu, Z., 2006. *Domesticating indigenous fruit trees as a contribution to poverty reduction*. *Forests, Trees and Livelihoods*. Vol. 16.
- 11) Leakey R.R.B. 1999. *Potential for novel food products from agroforestry trees: a review*. Food Chemistry. Vol. 66.
- 12) European Commission, 2000. Scientific Committee on Food: “*Opinion on the safety assessment of the nuts of the Ngali trees*” .Brussels, Belgium.