Partner Opportunity

PROSPECTUS

Engineered Wood Products Derived from Senile Coconut Stems

ACIAR Projects: FST/2019/128 and AGB/2021/172

Contents

Introduction:

This document is intended to provide information and clarity on the pre-commercial and projected commercial opportunities and benefits for potential private partners engaged in Australian Centre for International Agricultural Research (ACIAR) Project FST/2019/128.

In the context of this project, there are several activities which represent a degree of commercial opportunity. The largest in scale of these is in the process of transforming senile coconut stems into rotary veneer sheets which can be traded or further processed to create plywood or other engineered wood products (EWPs).

Success in this primary value chain is dependent upon commercial activity on the supply side (felling, transportation, and processing), and on the demand side (end-product purchasers for direct use or on-selling). Secondary value chain activities also exist (e.g., possible conversion of waste into saleable products) and though such activities are referenced within the Prospectus, the key focus is on the opportunity in processing of veneer and the manufacture of EWPs.

Disclaimer:

This Prospectus has been based on knowledge obtained under ACIAR projects FST/2019/128 and AGB/2021/172 to identify commercial opportunities in the processing of senile coconut stems into veneer and the manufacture of EWPs in Fiji. Though best endeavours have been employed to ensure accuracy, no warranty or guarantee is offered or implied. Readers are advised to use their own discretion when considering the information contained herein, specifically acknowledging that no part of this document shall be construed as investment advice or a recommendation to undertake or not undertake an investment of any kind.

Background:

The information and opportunities presented in this Prospectus reflect the substantial contribution to the renewal and sustainability of the coconut sector by several projects supported by ACIAR and conducted in Fiji during the past decade. There is a significant body of information now publicly available and accessible to stakeholders and other interested parties who might be considering options for engagement in the sector.

This research work has identified opportunities to utilise the vast stock of senile coconut palms for profitable investments along the value chain, as well as engaging with private sector firms interested in participation.

Based upon the 2018 Ministry of Agriculture survey of coconut plantations in Cakaudrove province, it has been suggested that within upwards of 50% of Fiji's stock of coconut palms will fall into the senile age category (50 + years old)[1] within the next 10 years, and without alternative use these palms represent an asset of minimal economic value. In fact, as a known host for pests such as the rhinoceros beetle, they represent a significant threat to the productivity of remaining productive stock.

Decorative panel made from coconut veneer overlaid on plywood. Source:[2]

Work already undertaken has demonstrated the potential for senile palms and other currently low-value forest resources to be transformed into high-value engineered wood products (EWP) suitable for local and international markets. By providing new, profitable outlets for what has traditionally been low-value log products, there is opportunity to increase the returns from these materials to farmers, timber growers and processors, contributing to the renewal of the coconut estate, and expanding employment and trade.

Work already undertaken has demonstrated the potential for senile palms to be transformed into high-value engineered wood products.

[1] ACIAR Project FST/2019/128 Value Chain Analysis Draft Report: 26th April 2022

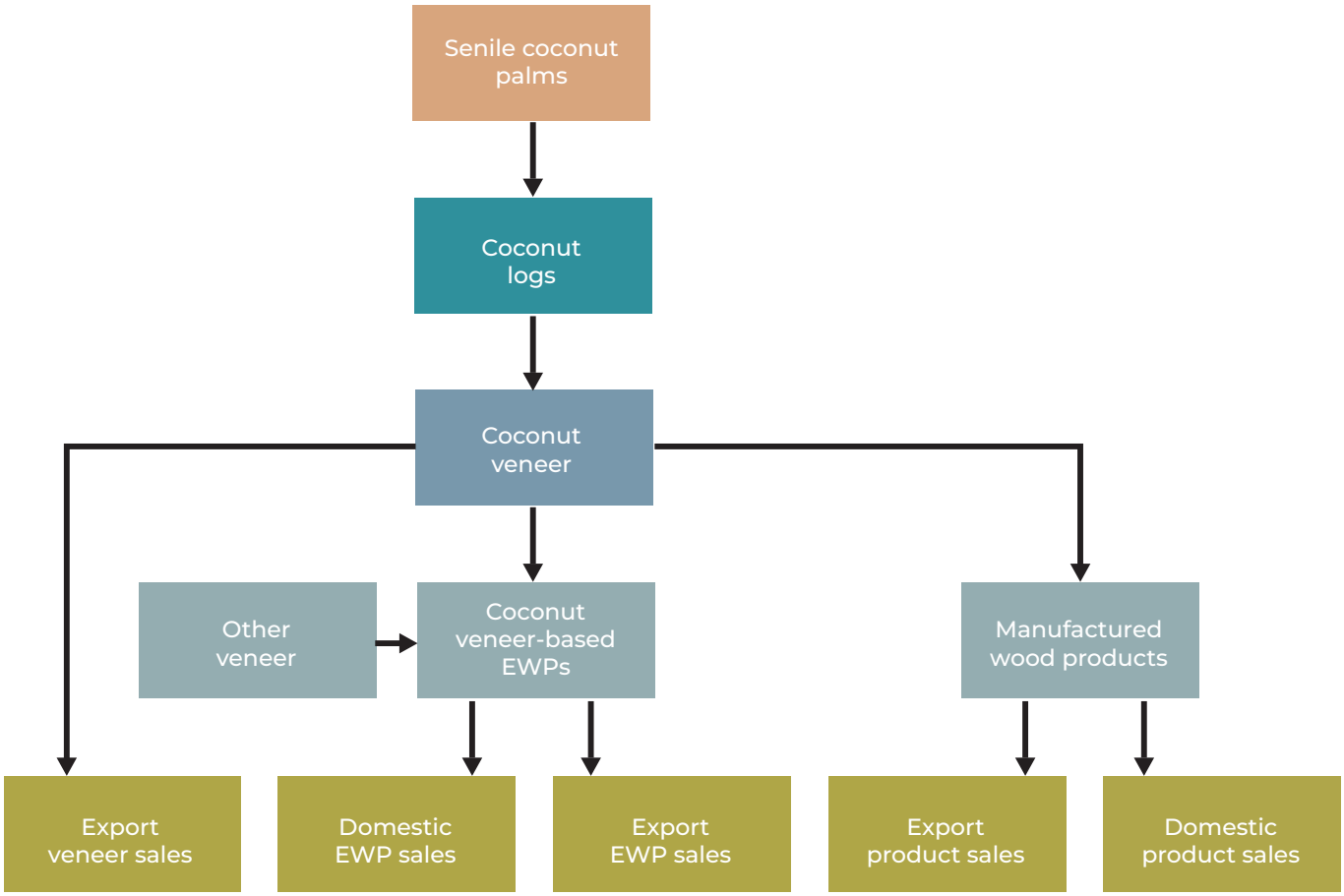
[2] A guide to the rotary veneer processing of coconut palms Robert McGavin, William Leggate, Henri Bailleres, Gary Hopewell and Chris Fitzgerald © Australian Centre for International Agricultural Research (ACIAR) 2019Decorative plywood panel made from coconut palm face veneers.

Maximising the potential opportunities identified is dependent upon the establishment of a value chain with sufficient incentive at each step to ensure ultimate end-market demand for finished EWPs is able to be met by a stable, sustained supply of suitable coconut palm stems.

This implies that felling, log removal, waste-management, replanting, transportation to processing facilities, primary and further levels of processing and manufacturing, grading, sale, and distribution of end products must together attain a durable equilibrium in challenging circumstances.

Value Chain and Market Description:

The potential value chain for senile coconut palm stem processing is depicted below:



Source: Potential Coconut Wood Value Chain for EWPs, CEF Progress Meeting Presentation:, M. Tabukovu, S Tawake, D. Young

Supply Side: Quantification of the resource available remains inexact. Uncertainties regarding the total area of land in Fiji populated by coconuts give way to widely varying estimates of the overall size of the estate varying from 18,000[3] up to 65,000[4] hectares.

Preliminary value chain analysis suggests around 240,000m^3 of senile coconut logs could be available for processing over the next 10 years.

[3] Fiji, Department of Agriculture, Economic Planning and Statistics Division. Report on the Fiji National Agricultural Census, 2009

[4] Coconut Industry Development Programme (July 2017) Pacific Coconut Sector Value Chain Workshop, Section 5.1

In addition, varying stand densities (i.e., palms per hectare) as well as the age profile of standing stock and the degree of attrition due to cyclone damage all act to reduce the accuracy of any estimates given.

Further considerations are the unknown percentage of stock which will be unusable by processors due to size, stem

Coconut palm stems left to decay after cyclone damage. Source: A McGregor SPC

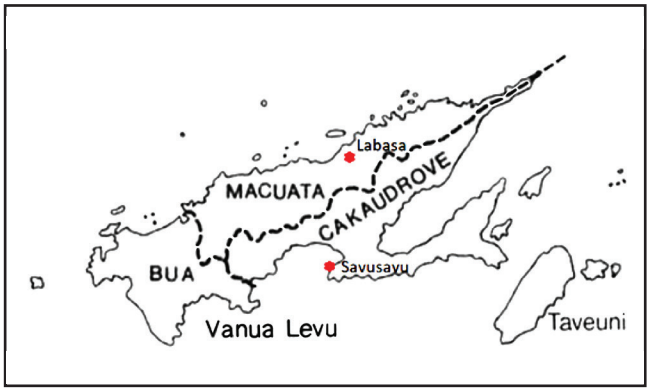
form, pest damage or other factors such as inaccessibility and other logistical constraints.

Notwithstanding these limitations, there is general agreement among industry specialists that around 70% of Fiji's coconuts are grown in the three provinces of the Northern Division, with most of these on the islands of Vanua Levu and Taveuni in the Cakaudrove Province.

This is made up of predominantly older, long-established free-hold plantations intermixed with smaller *Mataqali* controlled holdings.

Almost half of the available coconut stems are located in Vuna district, which is at the south-western end of Taveuni island, whilst the two existing rotary veneer operations capable of producing veneer and potentially able to process coconut wood are located on Vanua Levu, at Savusavu and Labasa.

Taking all the above factors into account, the preliminary value chain analysis undertaken by project FST/2019/128 suggests an indicative net figure of around 240,000 m^3 of senile coconut logs could be available for processing over the next 10 years from Cakaudrove Province. This extrapolates out to approximately 430-460,000m^3 of senile coconut logs nationally, an undetermined percentage of which will remain inaccessible on a commercial basis given the costs involved in exploiting the resource. Of any volume processed, research trials have demonstrated, approximately 45% of the peeled stem is recoverable as usable veneer.



Demand Side: The requirement for senile stems suitable for processing is directly related to end product demand. End product demand for veneer-based products falls into two broad categories: dried sheet veneer for (future product manufacture) and manufactured veneer-based EWPs.

Market investigations indicate a modest level of demand for premium veneer and EWPs in the domestic market (furniture manufacture, wall panelling, door manufacture, top-end residential, commercial and resort fit-out). There are, however, strong indications of interest in the product, provided that it consistently meets quality expectations.

As for international markets, there is confidence that providing prices are comparable with those of competitor products, premium grade veneer and EWPs will find ready markets, not only in close-proximity markets such as Australia and New Zealand, but also in locations such as Japan, Middle East, and Europe.

Early market enquiry indicates that the commercial value of EWPs will be significantly enhanced with their transformation into products with demonstrated "green" credentials. By leveraging the unique visual appeal of coconut products and its established "clean, green" image, this may be where Fiji can maximise returns.

Importantly, for both domestic and international markets, effective market development will be best achieved through prioritising prototype products which can be confidently presented to the market for consideration and evaluation.

Meanwhile, based on initial enquiries it is considered highly probable that the total output of premium grade veneer and EWP would be easily matched, or even exceeded by demand.

The greater market related challenge for processors will likely be securing markets for lower-grade output, which is expected to constitute the larger volume of output.
In this regard, Laminated Veneer Lumber (LVL) may offer opportunities, as may the domestic and regional islands market for wall and flooring materials suitable for use in low-cost dwelling construction. Some such options are being explored by the FST/2019/128 project and may warrant further focused consideration once the quality profile of the veneer produced and product testing is better understood.

Example of coconut veneer multilaminar block. Source:[5]

[5] A guide to the rotary veneer processing of coconut palms Robert McGavin, William Leggate, Henri Bailleres, Gary Hopewell and Chris Fitzgerald © Australian Centre for International Agricultural Research (ACIAR) 2019

Commercial Opportunities:

The potential value chain for coco-veneer production consists of several activities which have an economic value and are important to create a sustainable coco-veneer processing industry. These include:

- Felling
- Removal of logs to collection points
- On-farm waste-management
- Replanting
- Transportation to processing facilities
- Primary and further levels of processing and manufacturing, (log preparations, green veneer, dry veneer, products), grading
- Post-processing waste management
- Sale and distribution of EWPs.

The absence of any one of these activities compromises the integrity of the supply chain. It is noted however, that a number of these activities are better regarded as secondary value chain opportunities, not being of a commercial scale which warrants formal collaborative engagement with the FST/2019/128 project.

Consequently, while it is appropriate that every step in the supply chain be considered through the lens of commercial opportunity, the key opportunity of scale rests in the transformation of stems into saleable veneer- based products. With this as the primary focus, discussion on the secondary value chain opportunities are presented in Appendix 1.

Accurate quantification of the scale of this opportunity is limited by the data available. But, based on this information, primary processors based in Vanua Levu could potentially have access to approximately 320,000 m^3 of senile palm logs over the next 10 years.

Felled senile coconut stems awaiting conditioning prior and debarking.

Working with the minimum equipment set-up required (1 x 2.4m spindle-less lathe with an input capacity of 60m^3 per shift), this translates to processing of 12,000m^3 of stems per year yielding approximately 5400m^3 of veneer per annum. The economic value of this is dependent upon quality mix, what EWPs are manufactured, and market prices.

At this level of processing, subject to there being sufficient demand, there would appear to be an opportunity for between 2-3 full-time coconut veneer specialist processors to draw on stocks from Vanua Levu for a period of approximately 10 years.

That said, one critical consideration is the state of local logistics. Within Vanua Levu, several regulatory and other factors conspire to limit trucks to maximum 12 tonnes gross weight. This means that the proximity of processors relative to raw material will be a significant determinant in the cost of inputs, and ultimately the prices needed from the market to sustain a profitable processing operation.

Debarked and rounded coconut logs set I spindleless lathe ready for peeling into veneer. Source:[6]

A further important factor relates to Taveuni. Vuna district (south-western end of the island) holds almost half of the available senile coconut stems in Fiji. With no facilities to produce veneer or ply currently present on the island, there may be an opportunity here of appeal to investors keen to secure potentially exclusive access to a large volume of feedstock. Any such development would also deliver significant social and economic benefits to this part of the country.

However, any intending investors would need to contend with the high initial capital costs involved in establishing a greenfield operation. Key here is addressing the predicted substantial costs of installing infrastructure for generating heat and steam, essential for conditioning stems prior to peeling, drying veneer and in the manufacture of many EWPs.

The alternative could be to fell and transport stems to a different island for processing. In this option, the challenge moves from capital costs to operational costs related to road and sea-freight and minimising stem degradation with delayed processing.

Project FST/2019/128 will continue to explore ways to overcome various cost and technical barriers that might limit investor appetite. Meanwhile, to advance the ambition of establishing capacity for coco-veneer and related EWP production, it is apparent that existing operators are better positioned to avail themselves of the opportunity at an early stage.

In doing so, a focus on producing high-margin products pitched to the premium end of the market (premium grade face veneers and “green” products) will enhance financial returns. However, it is expected that a considerable proportion of veneer output will be lower grade, where competition from other sources will be encountered

Coconut Veneer laid up prior to drying. Source :[7]

[6] (Source: ACIAR FST/2009/062 Development of advanced veneer and other products from coconut wood to enhance livelihoods in South Pacific communities DAF Report - Coconut palm stem veneer processing Trial 4 March 201© State of Queensland, 2016

[7] ACIAR Coco-veneer Basic Equipment Operation - YouTube

Technical Considerations:

Technical: Processing of senile coconut stems through to veneer or EWPs such as plywood involves multiple steps and the utilisation of a large assortment of specific equipment. The overall process is depicted in the accompanying diagram. This demonstrates why existing plywood manufacturers face a significantly lower investment threshold than a greenfield operation.

The technical parameters for processing have been addressed in considerable detail by the current and earlier ACIAR projects.[8]

For the most part, equipment found in any standard plywood manufacturing plant can be used for manufacturing products using coconut veneer. However, trials identified challenges with the peeling of coconut palm stems due to their unique fibrous characteristics. Subsequently, the use of an appropriate spindle-less lathe set-up with correct settings proved to be successful at various trial scales of operation and was identified as the preferred option for the log peeling process.

A variety of equipment options are available in the market. Information on technical specifications and suppliers is available to interested parties Further information on equipment requirements can be found in the Financial Considerations section below.

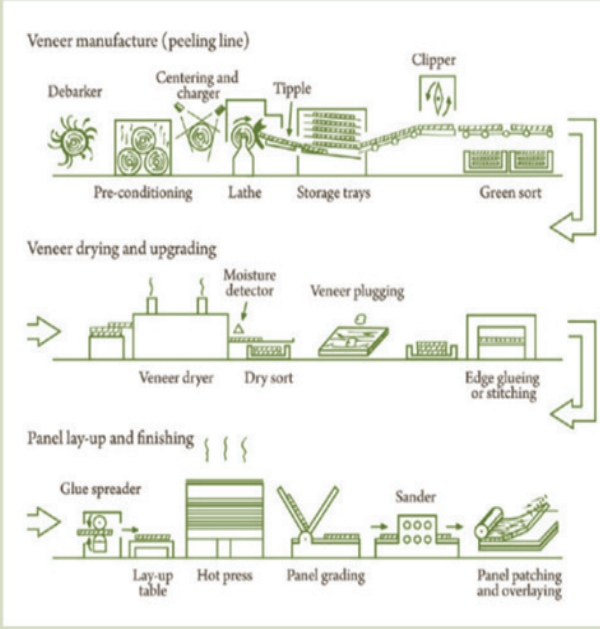


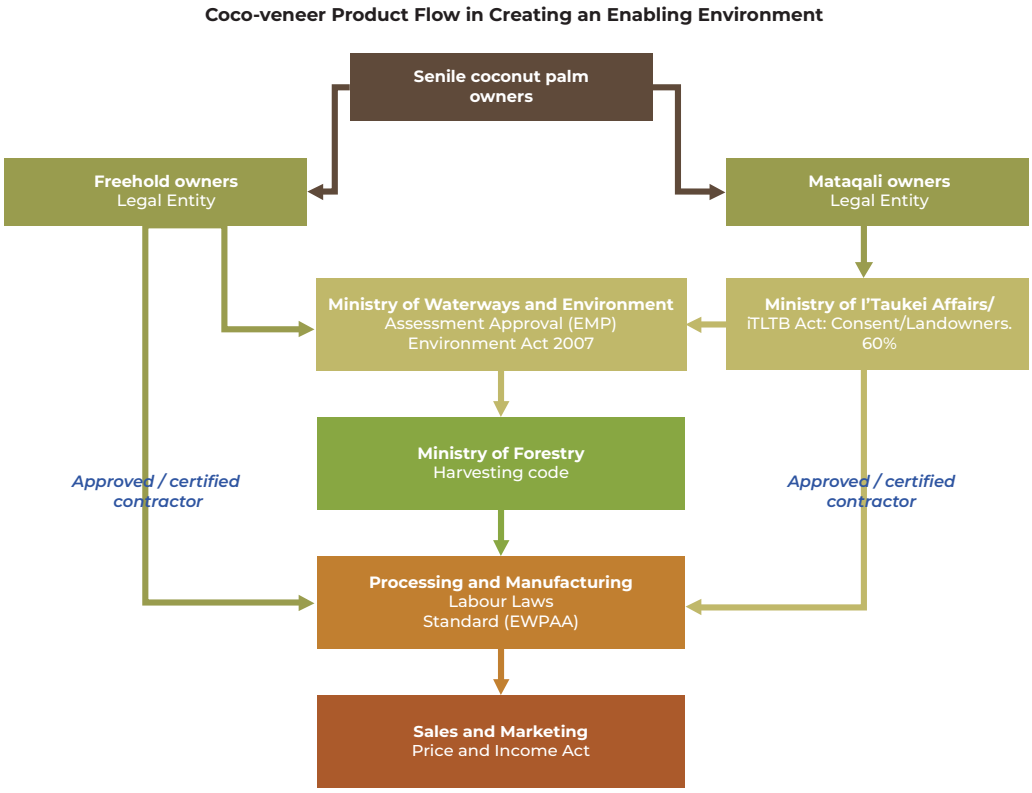
Figure 1.1. The three stages of panel manufacture. Source: Walker (2006), p. 399.

[8] Reports are available via the Publications page in the ACIAR website

Regulatory Considerations:

Exploitation of the senile coconut palm stock is subject to regulation by the Ministries of Agriculture, Forestry, Waterways and Environment and i'Taukei Affairs.

The diagram below provides an overview:



Source: M Tabukovu

The need for regulatory certainty is recognised and considerable work has already been undertaken to identify and address the concerns of the various ministries involved.

Dialogue with relevant Ministerial officials has been extremely positive. The Ministries of Forestry and Agriculture are generally supportive of the harvesting of senile palms. To the extent that any regulatory control is necessary, then this would more likely sit with Forestry as an addition / variation to their existing codes of practice.

For the prudent investor, an appropriate risk mitigation strategy would be to ensure that ahead of any financial commitment, formal acknowledgement of regulatory comfort or applicable parameters for senile coconut palm felling and processing was secured from all Ministries involved.

Due Diligence:

A Due Diligence process has been adopted to assist in qualifying, short listing, final selection, and recommendation of 'best fit' private sector partners for Project FST/2019/128.

This process incorporates collection and analysis of information addressing the following:

1. Legal, reputation and operating principles

a. Business history and stability;
b. Relationship to veneer and timber products value chains and governments;
c. Competing interests and the risk that these may compromise project outcomes;
d. Values and ethics; and
e. Legal or reputational risk.

2. Strategic and investment alignment with proposed project outcomes

a. Business strategy regarding inclusive veneer and timber products value chains; and
b. Approach to innovation.

3. Resources

a. Capacity to co-invest, particularly regarding public good outcomes;
b. Capacity to scale out interventions;
c. Expertise and skills;
d. Linkages and leverage to other value chain members; and
e. Access to finance.

4. Collaboration performance

a. Track record in business partnerships e.g., joint ventures;
b. Past participation in development/ public good projects; and
c. Business policy regarding intellectual property.

5. It is anticipated that all individuals or organisations indicating serious interest in partnering with the FST/2019/128 project may be subject to the above due diligence process.

Financial Considerations:

With several elements yet to be fully appraised, any financial projections that might be made regarding the opportunity under consideration would need to include several assumptions. It is therefore not appropriate at this stage to include financial projections in this prospectus.

An example of this is end-product pricing. While research on market prices for veneer and plywood products both within Fiji and several target markets has been undertaken, none of this specifically addresses the range of prices Fijian sourced coco-veneer might attract.

Further, there are no samples available to assist with essential market research, scoping and development activities. Price points and demand are yet to be established. Equally, it will not be until after several production runs after that there will be improved understanding of the output mix in terms of grade and quality, which in turn directly impacts average prices and potential revenues achieved.

Consequently, work to improve the understanding of costs and potential revenue streams under project FST/2019/128 will continue. This includes completion of the financial modelling component which aims to develop a comprehensive model considering the multitude of factors along the value chain which impact costs and revenues.

What can be provided at this stage are the broad financial parameters for potential producers of coconut veneer and related EWPs, derived from the work undertaken and reports of earlier ACIAR activities:

Estimated Resource Availability

Resource Assessment			Comments
Area of coconuts in Cakadrove Province (2018)	ha	10,300	From MOA survey
Older than 50 years in 2018	%	31	From MOA survey
Available to harvest in next decade	%	50	
Available to harvest in next decade	ha	5,150	
Average harvestable stems per ha	No	60	Range 40-70
Timber per stem:	m^3	0.74	
Length 15 m (6 x 2.5m billets)			Based on 2016 trials
Diameter 0.25 m			Based on 2016 trials
Timber per ha	m^3	44	
Total raw material available over 10 years	**m^3**	**227,612**	

Source; ACIAR Project FST/2019/128 Value Chain Analysis Draft Report: 26th April 2022

Processing Capacity: one 2.5 m spindleless lathe			
Lathe capacity	m^3/shift	60	McGavin estimate
Capacity utilisation	%	80	
Timber processed	m^3/shift	48	Gross volume before rounding
Shifts per year	No	250	
Timber processed per year	m^3/year	12,000	
Area of coconuts harvested per year	ha	272	
Recovery rate (percent of gross volume)	%	45	Based on 2016 trials
Veneer produced	m^3/year	5,400	

Reference Pricing:

The domestic market for plywood in Fiji offers a range of standard plywood products classified as either interior, exterior or marine, but are otherwise un-graded. There is little difference in retail prices of interior and exterior plywood prices, both of which average around FJD 2,070/m3 (ex. VAT) with a range from FJD 1,800 to FJD 2,700. Marine plywoods retail for FJD 3,200-3,277/m3 (ex. VAT). Fiji retail prices are generally lower than in Australia and New Zealand, with little product differentiation and a limited offer of premium priced plywood products, other than marine ply. Allowing for a 30% retail margin, ex-mill prices for undifferentiated plywood products in Fiji are estimated to be around FJD 1,500-1,600/m^3.

In Australia, retail prices for plywood products average AUD 3,360/m3 (ex. GST), equivalent to FJD 5,230/m3 which is 2.5 times the Fiji average. The Australian market is much more differentiated, with prices ranging between FJD 1,800 and FJD 10,300/ m3. The undifferentiated products (mostly CD grade) at the lower end of the product range sell for little more than Fiji retail prices and would not compensate for the costs of transport from Fiji to Australia. However, in the upper half of the range, AA through to BC grade products retail for between FJD 5,000 and FJD 10,000/m^3 (ex. GST). Well manufactured coconut plywoods could be expected to achieve prices in this range. The much higher prices would easily compensate for the cost of transporting product to this market and suggest that ex-mill prices could be in the range of FJD 3,000 to FJD 6,000/m^3.[9]

New Zealand prices are a little lower than Australia but with a comparable price spread between the standard and premium grade products. Given the lower cost of shipping to New Zealand and the less stringent and costly biosecurity protocols, similar returns could be expected in this market.

Based upon this information, returns for coconut plywood manufacturers will be maximised by a focus on the higher end of the plywood markets in Australia, New Zealand, and possibly other Pacific Rim countries. Products with single or double high-quality veneer faces using lower grade / cheaper mid layers can be reasonably

[9] Plywood Market Assessment 2022 (D. Young / M. Tawake).

expected to attract premium pricing in the market, on the proviso that quality consistently meets or exceeds expectations. The challenge for manufacturers will be in securing acceptable prices domestically or further afield for the volume of products that use the lower grade veneer that will also be produced.

Equipment Cost:

Information contained in the following tables was derived from a theoretical exercise undertaken by the FST/2019/128 project team to determine the possible capital costs involved in establishing an operational greenfield plant in South East Queensland. This looked at both the first step of producing green veneer, plus the additional costs of advancing to dry veneer capability.

The costs are in AUD, include the estimated costs of installation, but exclude land related costs. As such, the information is best regarded as indicative only and a useful guide to understanding the range of equipment required for a greenfield plant. In practice, shipping, and installation costs in the context of a specific location in Fiji need to be factored in.

Item	**Ind. Cost (AUD)**
Water storage	82,500
Log steaming/ bathing chamber	75,000
Biomass boiler	3,150,000
Log docking saw	23,000
Log charger	7,100
Log conveyor	15,900
Log debarked/ rounder	52,000
Waster chipper	230,000
Waste wood conveyor	20,700
Fuel bin for boiler	5,000
8-foot spindleless lathe	130,740
Veneer conveyor	20,700
Veneer clipper	58,030
Knife grinder	33,000
Control room	90,000
Veneer trolleys	10,000
Wrapping machine	17,250
Industrial bin	5,000
Forklift (2nd hand)	30,000
Buildings (360m^2)	270,000
Total (Green veneer production)	4,379,350

Item	**Cost (AUD)**
Jet drier (small)	417,190
Automatic feeder	69,000
Dry Veneer conveyor	20,700
Veneer trolleys	10,000
Forklift	30,000
Buildings (360m^2)	270,000
Total Additional for Dry Veneer	816,890

Green veneer sheet fed from spindleless lathe and prior to clipping. Source:[10]

[10] Unkown

Environmental Considerations:

Direct environmental considerations related to the project arise primarily in the two areas detailed below.

Post-Harvest Waste Management:

Effective post-harvest waste management is required to address both the potential biohazard presented by the coconut rhinoceros beetle (CRB), and the appropriate disposal or re-purposing of large volumes of heads, offcuts, and stumps.

It is in their own best interest that both large and small resource owners take ownership of both challenges, and earlier work undertaken with the support of ACIAR can provide significant guidance on both issues.11 Strategies can be adopted which limit the spread of the CRB, and green waste can be processed and repurposed as a soil conditioner or as source of biomass for power generation.

Processing Waste Management:

Several environmental considerations arise regarding the processing of coconut stems. Effective management strategies need to be considered for organic waste (offcuts, trimmings and saw dust). Use of this waste as biomass for power generation can be an effective means of addressing the issue. Attention must also be paid to any potential chemical waste related to timber treatment (if applicable) and glues; and petroleum products such as waste machine oils; as well as the appropriate storage and handling of fuel for power generation and heavy machinery.

Given the increased emphasis financiers place on the environmental credentials of projects under consideration, it is anticipated that intending collaboration partners will pay due attention to the proactive management of environmental risks associated with their commercial activities.

Avenues for Support:

Opportunities may exist for potential investors to attract external support for initiatives with positive environmental impacts. An example would be utilisation of a biofuel generator or boiler rather than a diesel power system. Further research on this is required but early work indicates a variety of potential options exist from within and outside Fiji.

[11] Development of Advanced Veneer and Other Products from Coconut Wood to Enhance Livelihoods in South Pacific Communities - Final Report. Published 24 August, 2016. Publication Code: FR2016-26

Risks:

As with any commercial endeavour, partners to this project will be exposed to a variety of risks. These include the following:

1. *Impediments to consistent supply of raw material*: Agribusiness supply chains are subject to impediments caused by weather or other events, at times with short notice. This can particularly be the case when seeking access to stands of senile palms on customary land.

   Mitigation tactics include establishment of sufficient onsite stock of suitable logs to act as a 2-4-week buffer to cover unexpected breaks in supply.

2. *Quality Management*: this stands as one of the key challenges which must be addressed from the outset for both financial and marketing reasons. Margins and market appeal will be maximised through close attention to delivering products with consistent and appropriate quality.

   This will require a pre-emptive approach to quality management rather than a reactive approach to quality control.

3. *Excessive exploitation of resource*: the longevity of the industry depends on the rate at which the available resource is exploited.

   The economics of the industry will change once stocks with ready access are fully utilised.

4. *Waste management*: Due to the biohazard risks associated with pests, conscientious and effective waste management is a high priority and stands as a significant risk to the initiative.

   Waste handling practices must mitigate potential spread of known pests and optimise use of organic material.

5. *Equipment break-down / supply of spare parts and consumables*: Especially as Fiji will be entering the market as a new supplier, inconsistencies in supply could seriously damage project viability.

   Partners will need to reflect this risk in their maintenance regimes and stock holdings of equipment spare parts, most of which will not be available locally.

6. *Domestic competition*: the scale of the resource suggests that Vanua Levu could potentially host two to three processors running single lathe operations without excessive competition for raw material for approximately 10 years . Viti Levu currently has no active veneer / plyboard processor, however, this situation is expected to change with the re-emergence of a previous producer during 2023. The running of a single lathe operation is believed to comfortably absorb the accessible stock of local raw material.

   On either island, the advent of an additional processor is likely to put pressure on stem prices as demand increases.

7. *End-product market competition*: Fiji sourced coconut palm derived EWPs will be entering an international market already supplied by other processors / manufacturers. The pressure here may be mitigated by delivering unique or bespoke products through a mix of marketing and engineering innovation.

Conditioned and rounded logs awaiting peeling. Source:[12]

[12] ACIAR Coco-veneer Basic Equipment Operation - YouTube

Next Steps:

Recipients of the Prospectus who want further information or who wish to be considered for possible collaboration / partnership should approach the ACIAR FST/2019/128 Project team as soon as possible.

To progress beyond this point as a potential partner, the Due Diligence process must be undertaken. The process will be expedited by the timely provision of all required information.

Prospective partners which satisfy the due diligence requirements will be shortlisted and further discussions held with the Project team. This may also include initiation of discussions with potential financiers.

Positive indications regarding necessary finance will lead to the signing of a MoU / Letter of Intent / Business Services Agreement and formalisation of the relationship with the Project.

Working with the Project team, a detailed scope of activities and indicative timeline will be determined and initiated ahead of any formal engagement.

Progress will be monitored throughout the period of formal engagement.

Appendix 1

Other commercial opportunities

Smaller scale opportunities are present throughout the supply chain. Some of these are well suited to small scale enterprises with limited access to capital, whilst others are more capital intensive and may be better suited to existing business operators.

Felling:

On both small and larger holdings, this activity can be undertaken by owners, or especially in the case of larger holdings, by contracted crews which would likely be supplied by an existing logging operator with capacity to haul and load logs as well. For smaller (*Mataqali*) holdings, there may be some opportunity for collaborative / shared resource endeavours.

In some situations, there may be added value in de-barking and log rounding being undertaken in-situ, prior to transport to a processor. This would ensure a lower percentage of waste material in transported stems. However, the merit of this is dependent upon access to cost-effective equipment, and the value of the bark / residue (e.g., biomass for power generation at the processing plant).

On-farm Waste Management:

Effective on-farm waste management has been the subject of some earlier ACIAR supported work but will likely require ongoing intervention and research to fully understand the scope of any commercial enterprise related to it.

Biohazard containment related to the rhinoceros beetle is critical. Beyond that, transformation of waste into a viable form of organic matter for soil improvement is the next logical step.

There may also be a commercial opportunity based on waste and stump removal and processing into a variety of value-added products. Validation of the opportunity requires further research on options and innovations for transforming the waste into saleable products. Given the remoteness of plantations relative to markets of any scale, this research needs to include consideration of the impact of logistics costs on overall commercial viability

At the same time, the potential for transforming waste into a source of biomass for small scale power generation to replace diesel powered generators can be explored.

Other potential uses include conversion to an activated carbon compound.

Replanting:

Replanting with suitable new stock is crucial to the revival and survival of the coconut sector. Production of seedlings might represent some degree of commercial opportunity, but this will be somewhat dependent upon the actions that various government departments take as well as the expectations of resource owners.

The Ministry of Forestry has indicated that coconut palm replanting may be covered under its 30 million trees in 15 years initiative. The Ministry of Agriculture may also have free coconut seedlings available. How this transpires in practice may differ between traditional larger scale plantations and the smaller Mataqali owned plantations.

Given the interest demonstrated to the CEF project team in revitalisation of the sector, notwithstanding the role government departments may play, any entities with significant vested interest may consider partnering with the project.

In this regard, it would be important to establish the level of financial resource such entities could commit to targeted investment.

Transport:

Provision of transport services will be critical to the success of the initiative. Several logging contractors whose businesses have suffered as access to native forest resources has been curtailed, have indicated a strong desire to provide senile palm harvesting and transport services.

Further Resources

https://www.youtube.com/watch?v=bP_I3KbN9dE

https://www.youtube.com/watch?v=TTbyoisJQ1U

A guide to the rotary veneer processing of coconut palms

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Further Information:

Further information is available by contacting:

Dr Rob McGavin
DAF Salisbury Research Facility
50 Evans Road, Salisbury Qld 4107
Phone: +61 412 341 832
Email: robbie.mcgavin@daf.qld.gov.au

Ratu Sefanaia Tawake
Pacific Community
SPC – Private Mail Bag – Suva, Fiji
Phone: 679 3379 570
Email: sefanaiat@spc.int