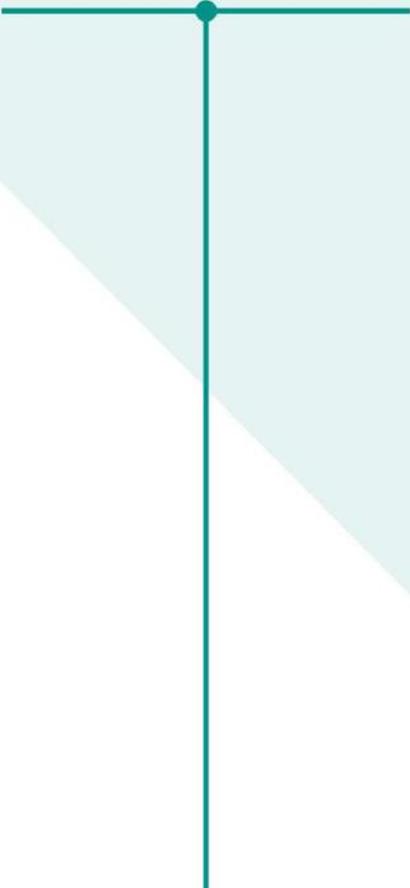


Improving market access for Vanuatu sandalwood

A description of existing trade and priority
activities for the sector

TECHNICAL REPORT

#132



Improving market access for Vanuatu sandalwood
A description of existing trade and priority activities
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Acronym List

Acronym	Description
ACIAR	Australian Centre for International Agricultural Research
AU	Australian Dollar
CIF	Cost, Insurance and Freight
FOB	Free on board
ha	Hectare
ISO	International Standards Organisation
PHAMA	Pacific Horticultural and Agricultural Market Access
VDOF	Vanuatu Department of Forests
VT	Vanuatu Vatu
US	United States Dollar

Executive Summary

The purpose of this report is to provide specific guidance to PHAMA, the Vanuatu Department of Forests (VDOF) and other stakeholders on the priority activities for improving market access for the sandalwood industry in Vanuatu. This report is based on a desktop analysis of recent industry studies and market data, with in-country consultation with industry stakeholders during November 2016 and January 2017.

The sandalwood industry in Vanuatu is currently in a state of uneasy transition, from its long history of harvesting and exporting the wild grown sandalwood (*Santalum austrocaledonicum*), to a new future based principally on managing and harvesting sandalwood plantations (of the same species), which have been established across the islands over the past 15 years. The earliest plantings will reach maturity over the next five years and harvesting is expected to increase thereafter.

In addition to this major shift in the resource base, the industry structure is currently in a state of flux. A decade ago, there were two licensees who managed all export sales and some domestic processing. Since then, regulatory reform has sought to enable a more open industry in which smallholder farmers can sell their sandalwood trees and logs directly, or via one of 15+ licence holders in Vanuatu. Only around five of these licence holders are active year-to-year; and domestic processing is minimal.

Under the current industry structure, most sandalwood is now sold as clean (de-sapped heartwood logs) through one-to-one (bilateral) negotiation with international buyers. These sales over recent years have constituted relatively small volumes, and each transaction typically relate to less than one tonne of sandalwood heartwood.

Over this period, sandalwood exports from Vanuatu have declined steadily from more than 100 tonnes of heartwood log in 2007, to around 11 tonnes of heartwood log in 2016. In value terms, sandalwood exports in 2007 generated payments to landowners of around US\$1 million, but have declined since; in 2016, the value was approximately US\$230,000 (which is higher on a unit price basis, reflecting increases in the unit prices paid to landowners over this period). Similarly, the contribution to overseas merchandise trade has reduced from around 2% of total FOB export value to less than 0.5% in 2016. By comparison, the average annual export earnings from Vanuatu's three main agricultural commodities - copra, coconut oil and kava –have each ranged between US\$7-11 million (FOB values) over the past five years; and in total these three commodities have accounted for approximately 40% and 60% of Vanuatu's total agricultural products overseas trade.

Meanwhile, producers in other countries, notably Australia, have established sandalwood plantations to both complement their wild-grown resource base and provide a new alternative to traditional supplies of Indian sandalwood (*S. album*). Australian growers have established around 15,000 hectare (ha) of Indian sandalwood and over 10,000 ha of WA sandalwood (*S. spicatum*). Harvesting has commenced in these plantations, and one of the major growers of Indian sandalwood plantations reported harvesting over 300 tonnes of heartwood last year alone, i.e. approximately 30 times the amount of Vanuatu's total harvest in 2016. Australia's harvest rates for planted sandalwood are expected to increase substantially over the next 5-10 years. With this type of scale, producers in Australia have established specific standards for sandalwood oil, looked to develop strategic customer relationships and forward sales agreements, and certification programs for both their forest management and oil production, including quality assurance aligned with use in cosmetic, aromatherapy and therapeutic applications.

In this context, the current structure for Vanuatu sandalwood export sales has significant limitations, notably:

- It is apparent that most Vanuatu sandalwood producers (farmers and their agents) do not know where and how their sandalwood will be used, i.e. they are not engaged in a value chain;
- There is minimal market trade information available to Vanuatu sandalwood producers to inform market access; and
- The fragmented nature of sales by multiple producers presents various challenges for the Vanuatu Department of Forests (as the regulator) to allocate its limited resources to monitoring and regulating industry trade and supporting industry development, including market access.

With the objective of improving market access for Vanuatu sandalwood, two specific industry development options representing alternative routes to market are considered in this report. These are:

1. establishing regular sandalwood auctions in Vanuatu; and
2. encouraging domestic processing for sandalwood within Vanuatu.

Regarding the rationale for *regular sandalwood auctions*: this option will not directly lead to aggregation of the resource base, selecting target markets, or establishing and building a strong brand. However, there are a range of benefits that include the potential for auctions to provide for: an increased level of market information and transparency; a simpler and potentially more efficient way for producers and prospective buyers to trade sandalwood; a clear focus for industry regulation and administration around sandalwood sales; and support for the development of a sandalwood log grading standard in Vanuatu.

Based on these benefits, and the scope to address limitations through the survey design, it is proposed that sandalwood auctions could significantly improve market access beyond existing arrangements, through a Government-administered process that could be readily implemented with support from the Government of Vanuatu and potentially programs such as PHAMA.

Regarding the rationale for *encouraging domestic processing*: it is important to highlight that domestic processing was a key objective of Vanuatu's Sandalwood Policy in 2002, and is reflected in subsequent government policies and regulations, including the *Industrial Development Act 2014*. However, despite some concerted efforts to establish domestic processing for the distillation of sandalwood oil, particularly during the mid- to late 2000s, most of Vanuatu's sandalwood exports have been sold as unprocessed (clean heartwood) logs.

Domestic processing also offers a range of potential benefits. These include the scope to: establish domestic processing clusters that could facilitate an aggregation of supply of resource, which affords economies of scale; increase market information and understanding of the value of Vanuatu sandalwood products; improve supply chain efficiencies; provide the basis for building a brand for Vanuatu sandalwood; provide an investment case involving increased employment and upskilling within Vanuatu.

However, there are also some significant limitations and challenges associated with domestic processing. Most notably, there is the challenge of demonstrating the financial and socio-economic returns from producing sandalwood oil would match or exceed the returns from exporting the wood. This report has identified a lack of comparable industry data, and noted the international market for sandalwood is highly opaque. Based on indicative price derivations for this report, the financial returns and value from domestic processing of sandalwood oil could be marginal at best compared to export sales of heartwood logs; particularly in the absence of a distinctive brand for the oil products. It is important sandalwood growers should receive returns commensurate to export markets, and domestic processors need to develop competitive supply chains.

More broadly, the findings from this report indicate there appears to be scope for Vanuatu sandalwood producers (smallholder farmers and their agents) to pursue higher prices for their products, through improvements to market information and product differentiation based on quality and the end market, coupled with associated changes to sales arrangements.

While sandalwood exports over the past 15 years have been at significantly lower levels than previous periods of exploitation, sandalwood continues to be an important crop for Vanuatu given its high value and alignment to existing lifestyles. Further to this, sandalwood is one of only few crops that generates income in the remotest areas of the islands, thus supporting livelihoods for these communities.

In this context, a set of proposed activities to improve market access for Vanuatu Sandalwood are listed below in Table ES-1. The key enabling activities, for other subsequent activities, include:

- Facilitating the establishment of a sandalwood industry forum;
- Supporting VDOF to establish a working group to consider the development of a Government-administered auction for sandalwood logs; and

- Supporting VDOF to provide further encouragement for domestic processing, by minimising inadvertent regulatory constraints on further investment.

Table ES 1 Proposed activities to improve market access for the Vanuatu sandalwood industry

Proposed activities	Potential next steps
1. Facilitate establishment of a sandalwood industry forum, which could be convened in Port Vila on a regular basis	<ul style="list-style-type: none"> • Convene first forum to discuss market access issues and sector priorities • Consider engagement with essential oils producers in Vanuatu for lessons learned input on trade development • Consider opportunity to invite international buyer to present on market requirements, e.g. a leading essential oil buyer in Australia or New Zealand
2. Support VDOF to establish a working group to consider the development of a Government-administered auction for sandalwood logs	<ul style="list-style-type: none"> • Engage with VDOF and other Government agencies as required on the potential benefits and regulatory scope • Use first industry forum (above) to discuss scope and stakeholder perspectives on establishing auctions
3. Support VDOF to provide further encouragement for domestic processing, by minimising inadvertent regulatory constraints on further investment	<ul style="list-style-type: none"> • Conduct joint review with VDOF -and potentially the Vanuatu Department of Industry and Commerce - of regulatory settings to facilitate appropriate investment in domestic processing • Engage stakeholders and offer PHAMA business management support for investment supporting market access
4. Conduct further investigation to better understand current end-markets and alternate market opportunities for Vanuatu sandalwood	<ul style="list-style-type: none"> • Conduct further market investigations to understand specific end-markets of Vanuatu sandalwood in New Caledonia, Australia, New Zealand and China, through further engagement with buyers and downstream processors • Scope the potential for alternative sandalwood buyers/markets with a potential interest in Vanuatu sandalwood and associated products • Establish linkages between potential buyers and Vanuatu sandalwood industry representatives, including the scope for market research and trade missions
5. Provide business support functions for industry enterprises seeking to establish market access for sandalwood exports	<ul style="list-style-type: none"> • Provide support where business plans exist that require specific inputs, e.g. technical expertise to consider establishing or expanding processing capacity; feasibility assessments for investment in processing technologies; and assistance with applications for grants and loans • Provide support to assist sandalwood producers in developing direct buyer linkages overseas, pending the development of any auction system
6. Support the establishment of sandalwood oil testing capacity in Vanuatu and/or through international affiliations	<ul style="list-style-type: none"> • Work with VDOF and appropriate authorities to develop testing capacity for sandalwood oil • Offer support for testing of oil quality from smallholder sandalwood interests, in target markets for oil products
7. Support VDOF to establish a public sandalwood register, which can be cross-referenced to VDOF harvest registers and export permits	<ul style="list-style-type: none"> • Facilitate Government initiative – through VDOF and potentially the Vanuatu Department of Lands – to design and develop a ‘live’ public record of the Sandalwood Register, with functionality to cross-reference regulated harvest and export activities
8. Support VDOF in providing	<ul style="list-style-type: none"> • Scope development of log grading guidelines, through further

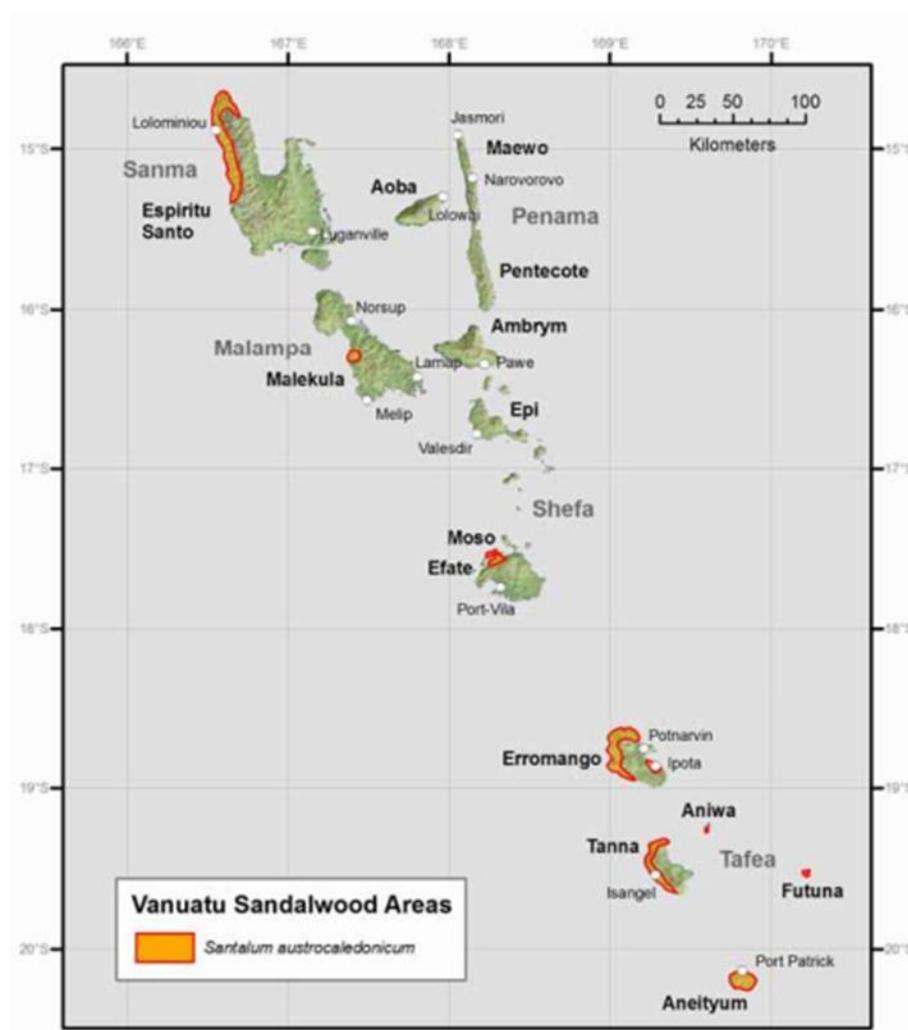
<p>extension to grower associations, e.g. through development of log grading guidelines to support grower focus on aligning products with market preferences</p>	<p>engagement with leading buyers of sandalwood heartwood logs</p> <ul style="list-style-type: none">• Support ACIAR to strengthen VDOF extension activities through provision of market-oriented training and guidance, e.g. use of log grading guidelines to demonstrate market preference and maximising value of planted resource
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1. Introduction

1.1 Sandalwood in Vanuatu

Sandalwood (*S. austrocaledonicum*) is found in the archipelagos of Vanuatu and New Caledonia. In Vanuatu, it occurs predominantly on the western parts of the islands of Santo and Erromango and in lesser quantities on Tanna, Aniwa, Aneityum, Efate, Malekula and Aneityum¹. A map of the natural distribution (excluding sandalwood plantings) is shown below (Error! Reference source not found.).

Figure 1 1 Natural distribution of *Santalum austrocaledonicum* in Vanuatu.



Source: Gillieson et al. (2008). Derived from a map provided by the Vanuatu Department of Forests, 2000

Vanuatu Sandalwood (*S. austrocaledonicum*) is one of seven main Sandalwood species that are currently used commercially around the world: the others are Indian sandalwood, *S. album* (occurring naturally in India and Indonesia); *S. insulare* (Cook Islands and French Polynesia), *S. lanceolatum* (Queensland, Australia), *S. macgregorii* (Papua New Guinea), *S. spicatum* (Western Australia) and *S. yasi* (Fiji, Samoa and Tonga)².

¹ Gillieson, D., Page, T. & Silverman, J. (2008) An inventory of wild sandalwood stocks in Vanuatu. ACIAR Project No. FST/2006/118. Australian Centre for International Agricultural Research: Canberra. 53 pp.

² Page T., Tate H., Bunt C., Potrawiak A. and Berry A. 2012. Opportunities for the smallholder sandalwood industry in Vanuatu. ACIAR Technical Reports No. 79. Australian Centre for International Agricultural Research: Canberra. 67 pp.

Overexploitation of natural sandalwood stands around the world has severely reduced the supply of its products; consequently, people in a range of countries have begun to plant sandalwood in plantations or within their normal garden/cropping systems. The most substantial plantings of sandalwood exist in Western Australia where Indian sandalwood (*S. album*) and WA native sandalwood (*S. spicatum*) have been planted extensively. Sandalwood planting in other countries has been limited for various reasons, including sandalwood's long-term rotation (typically at least 15-20 years), restrictive government policies regarding harvesting rights and the high level of competition for the use of land for food production (e.g. in India), the higher prices paid for other timber species (e.g. eaglewood in Papua New Guinea), and the impact of natural phenomena such as high fire frequency³.

In Vanuatu, planting of *S. austrocaledonicum* resulted in the establishment of up to 550 ha of smallholder plantings and 150 ha of commercial plantings between 2000 and 2012⁴. While volumes harvested from wild sources have declined markedly in recent years, researchers have estimated the increased sandalwood planting could result in a sustainable annual yield of approximately 300 tonnes by 2030. Such volumes would see Sandalwood again generating significant value to the Vanuatu economy, comparable to that currently derived from the other main agricultural products.

1.2 Report purpose and scope

The purpose of this report is to provide specific guidance to PHAMA, the Vanuatu Department of Forests (VDOF) and other stakeholders on activities to support improved market access for the sandalwood industry in Vanuatu. This report is based on a desktop analysis of recent industry studies and market data, together with in-country consultation with industry stakeholders during November 2016 and January 2017. A list of the stakeholders consulted during this study is presented in [Appendix A](#).

The scope of this report for PHAMA is limited to referencing these previous studies, and complementing the existing knowledge base with industry consultation and current market data. The structure of Vanuatu's sandalwood industry has been reported on extensively over recent years. Notable examples of comprehensive reviews and research papers include:

- a comprehensive review and inventory of wild sandalwood stocks in Vanuatu, published in 2008⁵;
- coverage of the 'Regional Workshop on Sandalwood Resource Development, Research and Trade in the Pacific and Asia Region', held in Port Vila, Vanuatu, in November 2010⁶,
- a review of opportunities for the smallholder sandalwood industry, published in 2012⁷; and
- the development of a grower's guide to sandalwood production in Vanuatu in 2012⁸.

This report for PHAMA draws on these previous studies and presents current industry perspectives, primarily in relation to *market access*. It should be noted that like previous reports, recent consultation with industry stakeholders has highlighted concerns about the conservation of wild grown sandalwood in Vanuatu. These concerns give rise to a range of issues relating to, for example, maintaining an inventory of the wild grown resource; monitoring the health of this resource over time; monitoring harvest rates and ensuring they are sustainable, or otherwise do not erode the productive capacity and biodiversity of the resource; and potentially establishing and managing conservation areas and agreements for specific areas.

These issues are highly important for Vanuatu, and can underpin market perceptions of the sustainability of Vanuatu sandalwood. However, beyond these market perceptions, these issues are not the primary focus of

³ Page, et al. (2012), *ibid*.

⁴ Page, T., Tate, H., Potrawiak, A., Berry, A., Bled, C. (2012). *Planted sandalwood developments in Vanuatu. Workshop paper*.

⁵ Gillieson et al. (2008), *ibid*.

⁶ SPC (2010) *Sandalwood Resource Development, Research and Trade in the Pacific and Asia Region. Proceedings of the Regional Workshop, Port Vila, 22-25 November 2010. Editors: Thomson, L., Padolina, C., Sami, R., Prasad, V. and Doran, J.*

⁷ Page, et al. (2012), *ibid*.

⁸ Page T., Tate H., Tungon J., Tabi M. and Kamasteia P. 2012. *Vanuatu sandalwood: growers' guide for sandalwood production in Vanuatu. ACIAR Monograph No. 151. Australian Centre for International Agricultural Research: Canberra. 56 pp.*

this report. Instead, this report focusses on industry structures, international markets, and potential roles for PHAMA or other programs to improve market access for sandalwood products.

2. The sandalwood value chain in Vanuatu

2.1. Overview

Previous studies have reported the history of sandalwood trade in Vanuatu dates to the 1850s, when sandalwood was harvested from natural stands by early European settlers and exported through Sydney to China in exchange for Chinese tea. This continued as different players, mainly interests based in Asia, became the main buyers of Vanuatu sandalwood.⁹

Exploitation of natural stands of sandalwood continued without regulation until the *Management and Control of Sandalwood Trade and Exports Order* was introduced in 1997, which introduced among other regulations, a system for licensing administered by the VDOF, the collection of government royalties, and a specified harvesting season limited to three months per year.

Over the next five years until 2002, the industry developed and several licensees showed interest in developing sandalwood into a local processing industry. In 2002, a Sandalwood Policy was introduced, with requirements for licensees to secure export permits before any sandalwood purchased under the licence could be exported. The policy restricted the export of unprocessed logs and only allowed a licensee to export oil, powder, spent biomass, and carving wood or carvings. Between 2001 and circa 2012, the industry had two licensed buyers (Tropical Rainforest Aromatics and Far North Timber Sales), each with an annual quota of 40 tonnes, i.e. a total of 80 tonnes.¹⁰

This limit on the number of sandalwood buyers underpinned aggregation of supply and provided scope for investment in domestic processing. This included the establishment of centralized warehouse facilities and distillation equipment in Port Vila, and work on establishing markets for oil products.

However, around 2012, in response to broader industry interests and policy drivers, the VDOF instituted a reform of the licence system for sandalwood. This led to the issuing of new licences, accompanied by an increase in the yearly quota of heartwood logs, up from 80 tonnes to 120 tonnes. While the pre-existing licensees retained their larger licences, this reform effectively opened the industry to new entrants, and reshaped the industry around multiple separate export arrangements, principally for primary log products, including de-sapped heartwood billets, clean roots and butts, and mixed heartwood flakes.

One effect of the reform was a disruption to the existing processing facilities in Port Vila, as the focus shifted from centralized processing and marketing to enabling smallholder producers and their buyer agents to sell their sandalwood directly.

Concurrently, landowner access to sandalwood growing in natural stands was becoming more challenging across the islands, and concerns over the sustainability of wild-harvesting practices were heightened. These factors and the reform of the licensing system have contributed to a steady reduction in exports of sandalwood logs over the past six years (refer **Error! Reference source not found.**).

Today, there are approximately 15 sandalwood licensees. Only 5-6 of these licensees are reported to be active, and total exports over the past three years have been less than 25 tonnes per year. In 2016, total exports across five licensees were less than 12 tonnes¹¹. Therefore, active licensees are handling on average less than 5 tonnes per year; some, considerably less.

Among the 5-6 active licensees, there are two main licensees that have interests in establishing a network of sandalwood producers that could support domestic processing operations, complemented by exports of

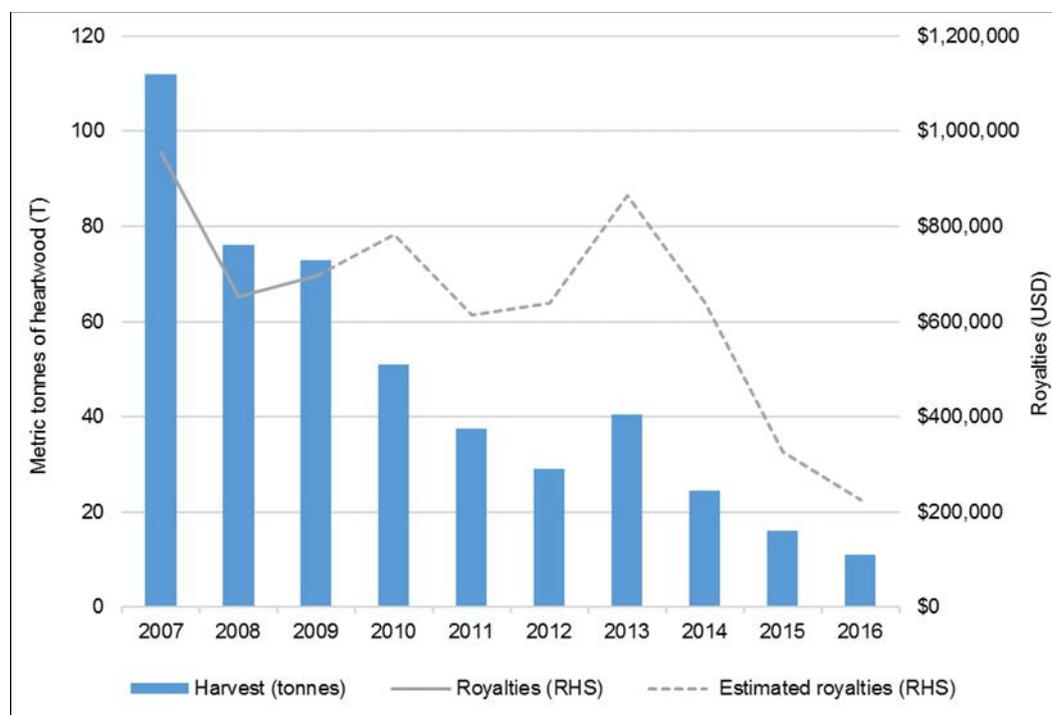
⁹ Tate, H. (2010) *Country profile for Vanuatu. Chapter contribution, cited in SPC (2010) Sandalwood Resource Development, Research and Trade in the Pacific and Asia Region.*

¹⁰ Page, et al. (2012), *ibid.*

¹¹ Vanuatu Department of Forests (2017) *Departmental data, provided on request in February 2017.*

specific grades of sandalwood material; while the other active licensees are primarily traders that have limited capacity to move beyond a trading position in exporting clean logs and lower grade sandalwood material.

Figure 2-1 Vanuatu exports of sandalwood heartwood logs, 2007 to 2016.



Source: Vanuatu Department of Forests

The typical Vanuatu sandalwood value chain that accounts for most of current industry production (refer Box 1 for an overview of the production process) comprises the following actors:

- **Farmers/smallholders:** with customary rights over the land, who are harvesting sandalwood from wild stands, which are being increasingly replaced by plantations established by the farmers/smallholders on their garden lots;
- **Sandalwood licensee:** the seller, who may be related to a group of farmers and smallholders, and operates as a selling agent for these farmers and smallholders, arranging for the harvesting and sale of sandalwood logs during the harvest season – mostly, clean (desapped) heartwood logs, in multiple grades;
- **International buyers:** the buyers, who are essentially representatives of importers and manufacturers, typically from Asia, who will negotiate prices with the selling agent – at or above the minimum selling price specified by the VDOF (see section 3.3) – and arrange consignments in shipping containers (typically 20 foot containers) or in some cases by aircraft.

A significant observation from consultations conducted with sandalwood licensees is they generally do not know the end market for their sandalwood logs, beyond their immediate customer. Furthermore, one of the main buyers of Vanuatu sandalwood over the past 2-3 years could not specify the end markets for the logs, as they are on-sold to buyers and distributors in China; who may then re-grade and direct the sandalwood to one of multiple markets.

While this value chain may be optimizing the allocation of Vanuatu sandalwood to different markets in China, it does indicate Vanuatu producers and licensees lack specific market information and are foregoing the opportunity to be producing and presenting their sandalwood specifically for target markets – with the aim of maximizing returns within Vanuatu.

Box 1 Brief introduction to the production and harvesting of sandalwood in Vanuatu

Vanuatu sandalwood is typically a small tree (5–12 m tall), which occurs naturally in west-coast Santo, western Malekula, north-western Efate, Erromango, Tanna, Aniwa, Futuna and Aneityum.

Traditionally, sandalwood has been harvested from wild stands by farmers/smallholders with customary rights over the land; and harvesting (or extraction) of wild grown sandalwood has occurred when trees are mature (typically an age class of 40+ years). In the case of plantation grown sandalwood, the time needed to develop enough heartwood for harvest will vary between trees and growing environments. In Vanuatu, the minimum size at which a tree can be harvested is a trunk diameter of 15 cm at breast height. Under good growing conditions, a tree of this size is approximately 15–20 years old.

The oil is particularly concentrated in the roots and butt of the sandalwood tree; therefore, the stump and roots are dug out to gain maximum saleable value from the tree. Heartwood is present in branches of older trees, but is unlikely to be in the branches of planted sandalwood with a rotation of 15–20 years.

Typically, sandalwood is harvested by:

- reducing the canopy with a bush knife to collect branches and prepare the trunk for felling;
- collecting and weighing cut branches with a portable scale;
- felling the trunk and cutting into logs using a chainsaw before or after digging out the roots
- digging out the roots using shovels and cutting the roots ready for weighing

Sandalwood is sold by weight. Before selling it, the only requirement is to remove the sapwood from around the heartwood. This is usually done by gradually cutting the sapwood away with a bush knife. This process results in two waste products: pure sapwood chips and second cutting chips, which are both used in the manufacture of incense.

Producers then sell the wood in small, easily transportable piece sizes to local buyers, who transport the wood by small truck and boat to aggregation points; ready for inspection by sandalwood buyers.

Source: Notes based on Page T., Tate H., Tungon J., Tabi M. and Kamasteia P. 2012. Vanuatu sandalwood: growers' guide for sandalwood production in Vanuatu. ACIAR Monograph No. 151. Australian Centre for International Agricultural Research: Canberra. 56 pp.

Note: As part of the field notes, the Page et al. (2012) Vanuatu sandalwood growers' guide provides an excellent set of photographs that illustrate the process for how sandalwood is harvested.

The value chain outlined above accounts for most of the recent and current wild-harvested sandalwood. The supply of wild-harvested sandalwood is reducing rapidly as smallholders find it increasingly difficult to access mature stands that can produce attractive yields. To mitigate the depletion of natural stands, and support a sustainable and commercially viable industry, the VDOF began actively promoting sandalwood planting during the 1990s.

In 2002, this initiative was formalised in a Sandalwood Policy that established the objective of increasing sandalwood stock through replanting. This policy also outlined that future sandalwood purchasing licences would only be issued to applicants who have “*actively participated in sandalwood reforestation*”¹². However, the first substantial plantings of Vanuatu sandalwood are only starting to reach maturity; and at present, the value chain for plantation sandalwood products is essentially the same as for wild-harvested sandalwood.

¹² Page et al., 2012, *ibid*.

Figure Error! No text of specified style in document.-1 Vanuatu sandalwood trees growing on Efate



Young plantation grown sandalwood



Young wild grown sandalwood in remnant vegetation

Figure Error! No text of specified style in document.-2 Vanuatu sandalwood trunks, butts and roots



Efate farmer with trunk from 15-year old tree



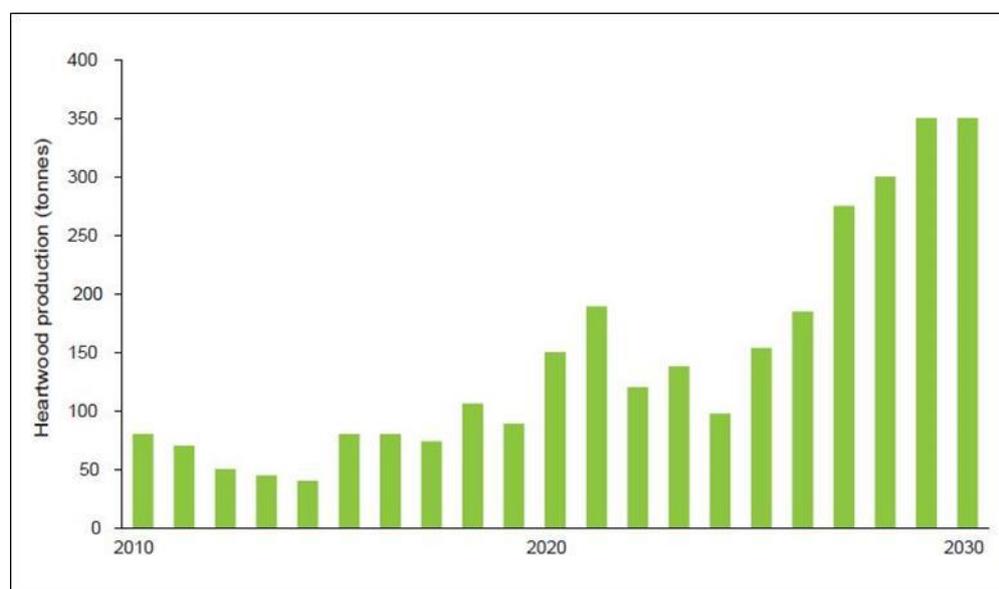
Clean (desapped) trunk and roots

While most of Vanuatu’s sandalwood has been exported in log form, there is some domestic processing underway. Domestic value added activity comprises a relatively small scale essential oils distillery set up at The Summit, near Port Vila, and the relatively recent development of a sandalwood oil distillation facility on Malo, near Santo. Collectively these facilities are currently processing around 5 tonnes per year of sandalwood logs; but they both provide employment for approximately five Ni-Vanuatu staff, and have some (limited) capacity for expansion over time.

The Summit Estate has an extensive sandalwood plantation holding (around 100ha) that is maturing and will produce a substantive flow of plantation wood over the next 10 years. If this resource is utilized for oil production predominantly, it will require a much larger oil distillation facility than currently exists.

Indufor understands the total planted area of Vanuatu sandalwood is currently around 600-700 hectares (ha) across the islands¹³. The nature of this plantation resource has been described comprehensively in other recent studies, e.g. ACIAR (Page *et al.* 2012). There are high expectations in Vanuatu for its burgeoning sandalwood plantation resource that will continue to mature and come on stream through harvesting over the next 5-10 years (**Error! Reference source not found.**).

Figure 2-4 Potential annual heartwood production from Vanuatu's planted sandalwood resource.



Source: Page et al. 2012. Opportunities for the smallholder sandalwood industry in Vanuatu

It should be noted the current structure of the industry is set up for relatively small scale export operations, generally on a spot sale basis. Indufor considers a more consolidated industry structure will likely be required to manage the significantly larger flows of plantation sandalwood resource expected to arise, especially if the channels to market will be through a small number of ports, i.e. at Port Vila, on Santo and Erromango.

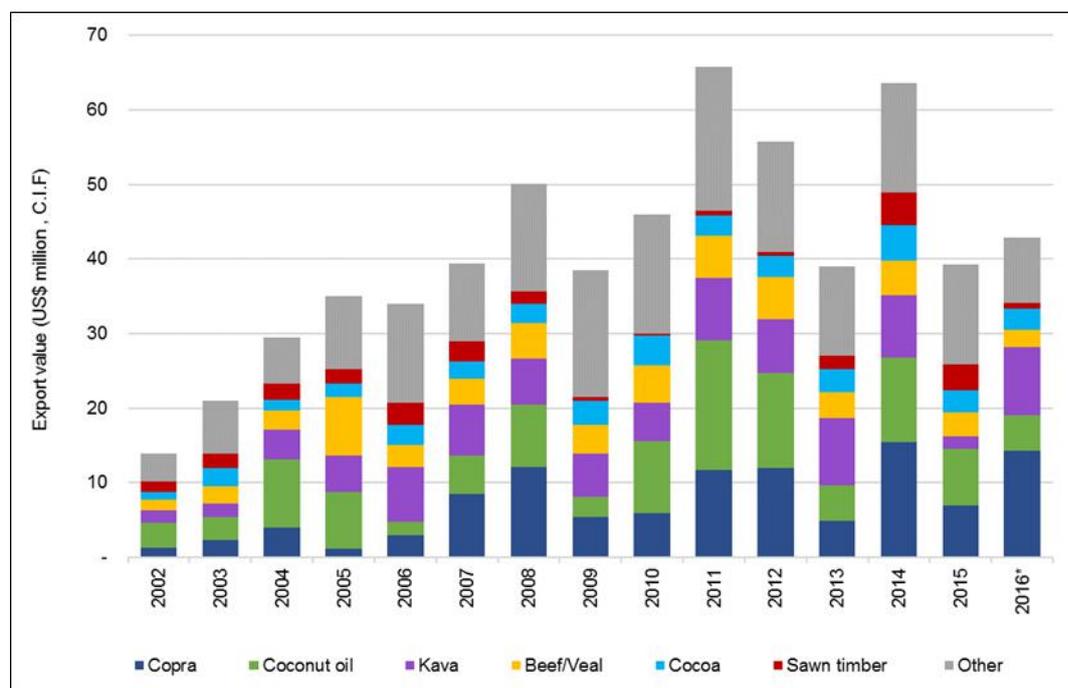
2.2. Trade status

While the extraction and export of sandalwood was the first international commercial industry in Vanuatu, the leading export commodities now comprise copra, coconut oil, kava and beef (**Figure Error! No text of specified style in document.-3**). The contribution of these commodities has varied over time. In October 2016, for the main export commodities, Copra constituted the largest share in value at

¹³ Page et al., 2012, *ibid.*

42%, followed by kava at 18%, cocoa 13%, coconut oil at 5%, beef and root crops at 4% each, coconut meal at 2%, sawn timber and live fish at 1% each, and coffee recorded less than 1%¹⁴. Over the past five years, the average annual export earnings from copra, coconut oil and kava have each ranged between US\$7-11 million (FOB values) over the past five years; and in total these three commodities have accounted for approximately 40% and 60% of Vanuatu’s total agricultural products overseas trade.

Figure Error! No text of specified style in document.-3 Relative export earnings for agricultural commodities in Vanuatu.



In recent years, sandalwood products have been recorded by Customs under the category of ‘Other products’, which also includes tamanu oil. Sandalwood exports from Vanuatu have declined steadily from more than 100 tonnes of heartwood log in 2007 (generating landowner royalties of around US\$1 million), to around 11 tonnes of heartwood log in 2016 (around US\$230,000, based on steady increases in unit price over this period)¹⁵. The contribution to overseas agricultural trade has reduced from around 2% of total FOB export value to less than 0.5% last year.

2.3. Resource information and registers

The VDOF is responsible for monitoring the sandalwood industry in Vanuatu and enforcing any breaches of the Forestry Act or its Sandalwood Policy from 2002. As part of this administrative responsibility, the VDOF has developed resource information that includes:

1. A Sandalwood Register, of landholders who have planted sandalwood on their land and registered these interests with the Department; and
2. An annual Sandalwood Harvest Record, which records Sandalwood licensees, licensee quotas, and reported harvests against these quotas. This harvest record incorporates harvesting of wild-sourced sandalwood as well as planted sandalwood.

This resource information is collected and analysed for Department use only at this stage. There would be merit in the Sandalwood Register being made publicly available, potentially on request, primarily to provide

¹⁴ Vanuatu National Statistics Office (2017) Statistics Update: Merchandise Trade Statistics. October 2016.

¹⁵ Indufor estimates of value based on Vanuatu Department of Forests export data.

for clarity and transparency in relation to reported landholdings and associated sandalwood interests across the Islands. Previous studies have noted the issue of theft of sandalwood, and industry consultation for this review identified the lack of a transparent register as a risk for investors seeking to establish or expand facilities set up to aggregate sandalwood from a range of buyers.

A public register of sandalwood interests may also assist the VDOF with monitoring of the resource base (as the basis for an inventory that is maintained over time), as well as regulatory controls relating to harvest and export permits. The lack of a public register is not seen as a primary issue constraining market access, but it represents a limitation of the regulatory framework that could be strengthened to support further investment in the industry.

2.4. Industry strengths and opportunities

Previous studies have addressed the structure of the smallholder sandalwood industry in Vanuatu and specifically considered the strengths and opportunities as well as the weaknesses and threats (e.g. Naupa in 2010¹⁶, and Page et al. in 2012¹⁷). A summary of the strengths and opportunities identified in the previous studies is set out in [Appendix B](#).

Indufor has reviewed this characterization of industry opportunities and noted the status today; specifically, whether they continue to be high, moderate or low. The key opportunities arising from this assessment comprise the following:

1. Marketing strengths:
 - a. Vanuatu sandalwood is readily accepted in markets in Europe, the middle east and Asia;
 - b. Vanuatu sandalwood is currently perceived as being of higher quality than Australian sandalwood (*S. spicatum*), including oil yields and oil quality;
 - c. The unique natural and cultural environment and vibrant tourism industry in Vanuatu may offer domestic marketing opportunities (e.g. agritourism and 'suitcase exports'); and
 - d. The sandalwood industry could potentially 'partner' with other Vanuatu industries (e.g. tourism) in activities such as the development of promotional programs and branding. The tropical island image of Vanuatu, if coupled with other values such as certified sustainable production practices, strong indigenous linkages, organic certification and/or Fairtrade certification, could be developed as the basis of niche marketing strategies in high-value markets.
2. Development of industry standards or product certification:
 - a. The industry has detailed knowledge of the local species based on research over previous decade, including an understanding of certain chemotypes and alignment with standards; and
 - b. There is an opportunity for collaboration to establish internationally recognized standards.
3. Improvements to supply base:
 - a. Research and development programs, notably those led by ACIAR, are being undertaken to improve product quality and promote industry investment and growth; and
 - b. An available land resource exists that is conducive to sustainable production.

2.5. Industry weaknesses and threats

Similarly, previous studies have identified weaknesses within the sandalwood industry in Vanuatu. A summary of the weaknesses and threats identified in previous studies is set out in [Appendix B](#).

¹⁶ Naupa, J. (2010) *SWOT analysis of the Vanuatu sandalwood industry. Chapter contribution, cited in SPC, 2010, Sandalwood Resource Development, Research and Trade in the Pacific and Asia Region.*

¹⁷ Page T., Tate H., Bunt C., Potrawiak A. and Berry A. (2012). *Opportunities for the smallholder sandalwood industry in Vanuatu. ACIAR Technical Reports No. 79. Australian Centre for International Agricultural Research: Canberra. 67 pp.*

Indufor has reviewed this characterization of industry challenges and noted the status today; specifically, whether the relative impact of these challenges continues to be high, moderate or low. The key challenges arising from this assessment comprise the following:

1. Investment challenges and risks:
 - a. The impact of policy positions on the sandalwood supply chain and political interference impacting on private sector investment.
2. Limited industry coordination:
 - a. There is no Vanuatu sandalwood industry peak body or strategic plan currently in place;
 - b. No industry grade standards or certification protocols have been determined or implemented specifically for Vanuatu sandalwood logs or oil;
 - c. There are economic and social challenges that exist at the interface between the 'traditional economy' and the 'modern economy';
 - d. Poor marketing strategies can adversely impact on the reputation of certified sandalwood oil; and
 - e. There has been limited investment in market research and development to date.
3. Limited supply relative to other producers:
 - a. The declining natural resource is reducing the size of the Vanuatu sandalwood industry, which will reduce Vanuatu's market presence in the short to medium term until plantation sandalwood reaches maturity;
 - b. Large volumes of Australian plantation sandalwood species are now entering international markets;
 - c. The size and value of the current and projected resource in Vanuatu limits production and marketing options relative to high-volume producers;
 - d. Vanuatu has high internal transport costs and geographic isolation from large markets;
 - e. Natural disasters such as cyclones can cause significant production disruptions; and
 - f. There is a lack of funds committed to the further planting of sandalwood.
4. Other challenges:
 - a. Theft of young (immature) sandalwood trees and seedlings.

This review of industry strengths and weaknesses, opportunities and threats, provides context for the consideration of access to international sandalwood markets, discussed further below.

3. International sandalwood markets

3.1. Market overview

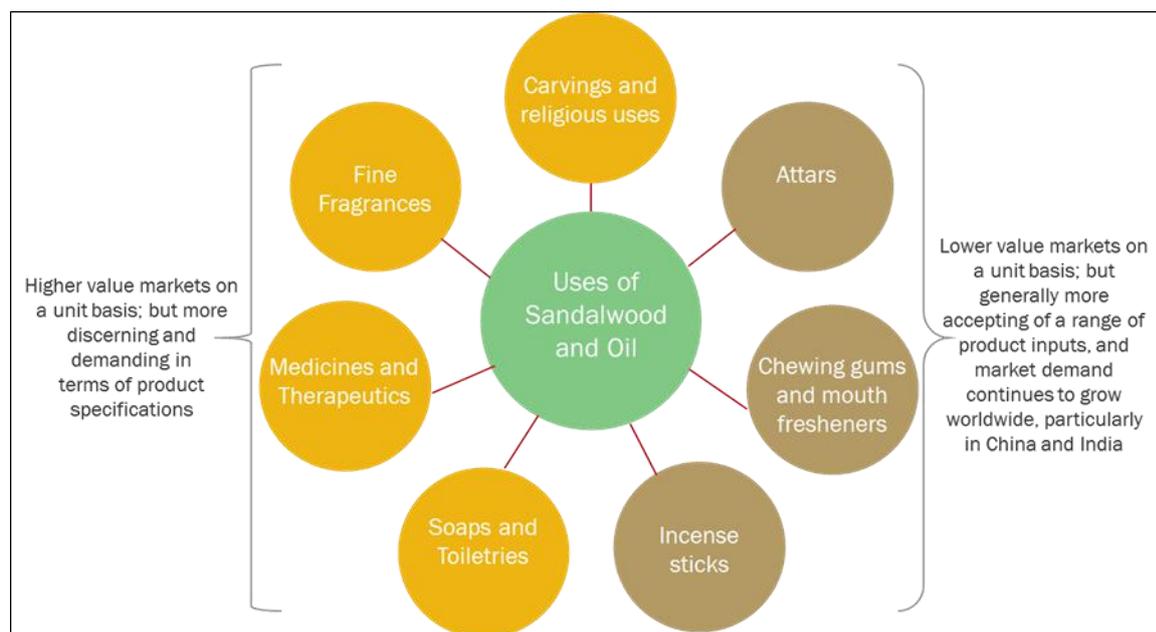
The total harvest of sandalwood around the world is estimated to be between 5,000 and 7,000 tonnes per year.¹⁸ This estimate encompasses all sandalwood log products; but it broadly represents the scale of sandalwood heartwood produced from natural stands and plantations worldwide. Indian Sandalwood continues to account for most of this supply; indicatively, around 4,000 tonnes in 2015¹⁹.

By comparison, the harvest of Vanuatu sandalwood from natural sources between 2000 to 2010 was approximately 80 tonnes per year, which represented around 1-2% of world supply at the time²⁰.

Export markets for Pacific sandalwood are predominantly in Asia — in particular, China, Taiwan, Singapore, Korea and Japan, none of which have natural resources of sandalwood themselves. India, while a major producer, is also a major importer due to supply shortfalls in its domestic market.

Sandalwood has many uses and a broad range of market segments (Figure Error! No text of specified style in document.-4). The highest value markets comprise the demand for sandalwood logs for carving and religious uses; followed by use of sandalwood oil for fine fragrances, medicines and therapeutic products. Meanwhile, there is large and growing demand for sandalwood in lower value end products including attars (fragrant blends of sandalwood and flower oils), chewing gums and mouth fresheners, and incense sticks.

Figure Error! No text of specified style in document.-4 Overview of key market segments for sandalwood and sandalwood oil products



Source: Derived from Padmanabha, 2015, Expert Sandalwood Market Report for TFS.

The production of attars is reported to consume around 60% of India’s annual supply of Indian sandalwood oil; while the pan masala industry in India (which uses sandalwood as a key ingredient in its chewable mouth

¹⁸ Coakley, T. (2012) Sandalwood markets and threats. Proceedings of International Sandalwood Symposium 2012, University of Hawaii, October 2012.

¹⁹ TFS (2016) TFS AGM 2016 Presentation. Data source referred to as a study of Global Demand for Legal Indian Sandalwood, by a top-tier global management consultancy firm, August 2016.

²⁰ Tate, H. (2010), Ibid.

freshener products) has grown at a rate of approximately 25-30% per annum over the last 30 years²¹. Incense sticks, made from sandalwood 'spent charge' (powdered heartwood from which the oil has been extracted), are burned during religious ceremonies and for meditation. With millions of people burning incense sticks each day, total consumption amounts to billions of sticks burned each year.

Detailed market data is not readily available, beyond reports commissioned and presented by leading producers of plantation sandalwood. For example, TFS Corporation (now 'Quintis'), which is reportedly the largest grower of Indian sandalwood plantations worldwide, commissioned a study of global demand for Indian Sandalwood, which reported on high levels of latent demand that will drive consumption – up from around 4,000 tonnes to around 20,000 tonnes in 2025²². This projection for growth is underpinned by expectations of substantial increases in demand in end markets comprising traditional uses of carving logs and wood for other religious uses (notably in China and India), as well as uses in producing fragrances, cosmetics and pharmaceutical products (notably in the US and Europe)²³. The lack of reliable, publicly reported data available

Vanuatu is now one of the remaining significant producers of sandalwood in the Pacific region. Other countries including New Caledonia, Fiji, Tonga, and Papua New Guinea have produced and exported considerable quantities of sandalwood material (of different species comprising *S. austrocaledonicum*, *S. yasi* and *S. macgregorii* respectively) over time. However, a review of historical perspectives, recent sandalwood trade and the prospects for the Pacific Islands in 2010 observed there were very few mature *S. yasi* trees remaining in Fiji and Tonga, and the species can be considered on the verge of commercial extinction until planted trees attain maturity²⁴. Regarding Papua New Guinea, the same review in 2010 observed the quantity of heartwood exported has declined from 73 tonnes in 2003 (a record high in the past 20 years) to only two tonnes in 2006. Indufor understands that Papua New Guinea sandalwood exports have remained at low levels since.

Regarding New Caledonia, during the mid-2000s, between 45 and 55 tonnes per year of sandalwood (*S. austrocaledonicum*) heartwood was harvested by traditional landowners²⁵. However, in 2015, the Government of New Caledonia introduced a national ban on the export of all forms of sandalwood, i.e. a ban on exporting any unprocessed, dead or green wood, and spent charge²⁶. This decision was prompted by government concerns about a dramatic loss of the natural resource over the past 20 years, due to overexploitation and illegal harvesting (harvesting beyond specified quotas). This ban means that New Caledonia is now entirely focused on domestic processing, through one of two oil distilleries (one set up on Mare Island and another on the Isle of Pines). However, Indufor understands the total production of sandalwood oil in New Caledonia has been limited to around 1 000-1 500 kg per year, given current levels of sandalwood stocks²⁷. This may present market opportunities for Vanuatu producers; although industry consultation in Vanuatu indicated higher prices for Vanuatu logs can be achieved in other markets.

While Vanuatu remains one of the significant producers in the Pacific region, its annual export volumes are much less than those from Australia, notably Western Australia. The State of Western Australia has been exporting its native sandalwood (*S. spicatum*) since the mid-1800s; and over the past 10 years, the average harvest of sandalwood from wild grown rangelands has been around 2,500 tonnes per year - i.e. approximately 10 times the annualized volume exported from Vanuatu.

The major export markets for sandalwood products from Vanuatu and Australia include China, India, United States, and Taiwan. Reliable trade data on sandalwood log exports and imports into these markets is limited. The Global Trade Atlas provides some useful data on sandalwood log exports from countries including Vanuatu and Australia, into Taiwan and India, while trade data on sandalwood log exports to China is not available on a

²¹ Padmanabha, A. (2016) *Expert Sandalwood Market Report*. Prepared specifically for TFS 2016 Retail Offer PDS.

²² TFS (2016) TFS AGM 2016 Presentation. *Ibid.*

²³ TFS (2016) *Ibid.*

²⁴ Thomson, L. and Doran, J. (2010) *Historical perspectives, recent sandalwood trade and future prospects from the Pacific Islands*. In *Sandalwood Resource Development, Research and Trade in the Pacific and Asia Region*. Proceedings of the Vanuatu Regional Workshop, Port Vila, 22-25 November 2010.

²⁵ Thomson, L. and Doran, J. (2010) *ibid.*

²⁶ Order No. 2015-2853 / GNC of 8 December 2015 on the absolute prohibition of sandalwood in New Caledonia intended for export. *Official Journal of New Caledonia*, 10 December 2015.

²⁷ Bourjine, P. (2010) Chapter 3.4. *New Caledonia*. In *Sandalwood Resource Development, Research and Trade in the Pacific and Asia Region*. Proceedings of the Vanuatu Regional Workshop, Port Vila, 22-25 November 2010.

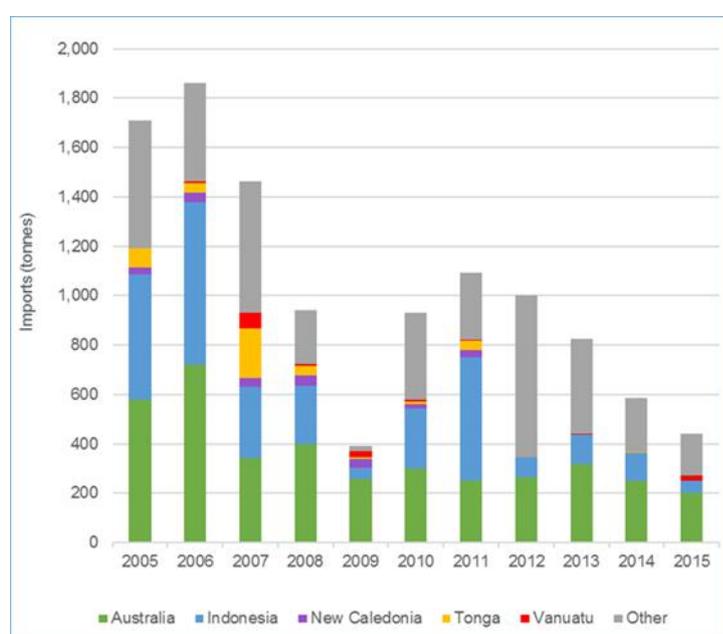
comparable basis. Sandalwood log exports to Taiwan over the past 10 years are presented below (Table Error! No text of specified style in document.-1) and (Figure Error! No text of specified style in document.-5).

Table Error! No text of specified style in document.-1 Vanuatu and Australia exports of sandalwood logs, selected countries, 2005 - 2016

Sandalwood log export volume (t)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Vanuatu exports to Taiwan	-	8	62	9	26	7	4	-	2	1	19
Australia exports to Taiwan	578	718	342	399	257	299	251	266	319	250	200
Australia exports to India	-	-	-	-	-	-	-	141	655	464	303

Source: Global Trade Atlas

Figure Error! No text of specified style in document.-5 Taiwan imports of sandalwood logs, 2005 to 2016



Source: Global Trade Atlas

These data serve to highlight the relative scale of Vanuatu production and exports of sandalwood logs compared to Australia over the past decade. Most of these exports relate to wild harvested sandalwood from natural stands.

Perhaps more significantly, Western Australia has seen burgeoning growth in sandalwood plantations, comprising rain-fed WA sandalwood (*S. spicatum*) plantations in the south west of the State (currently over 10,000 ha), and irrigated Indian sandalwood (*S. album*) plantations in the northwest, complemented by plantings in the Northern Territory and Queensland (indicatively, around 15,000 ha in total).

Harvesting has commenced in these plantations, at a relatively small scale compared to forecasts for harvesting in 5-10 years. One of the major growers of Indian sandalwood plantations, TFS Corporation, harvested over 300 tonnes last year²⁸; i.e. approximately 30 times the total Vanuatu harvest in 2016 – and TFS is forecasting a 100% increase in product sales in 2017²⁹.

²⁸ TFS Corporation (2016) 2016 AGM Presentation. Online: www.tfsltd.com.au

²⁹ TFS Corporation (2016) *ibid*.

This level of plantation development in Australia has implications for the marketing of Vanuatu sandalwood. Most notably, it suggests the increasing importance for Vanuatu to differentiate its sandalwood product from international competitors. Studies across the Pacific Islands have observed that future opportunities for Pacific Island sandalwood, including Vanuatu sandalwood, are likely to involve niche marketing, focusing on unique cultural dimensions and oil profiles.³⁰ The scope for Vanuatu to establish niche marketing models is discussed in the context of industry development and branding, below (Section 3.4).

3.2. Species preferences

The valuable fragrant oils of sandalwood trees are concentrated in its heartwood. The market value of a given volume of heartwood will depend primarily on the concentration and quality of its oil.³¹ The oil consists of a range of different compounds, but the quality of sandalwood in the marketplace is typically determined by the relative proportions of α - and β -santanol, regarding the international standard for Indian sandalwood (*S. album*) oil (ISO 3518:2002). Heartwood oil concentration and quality in sandalwood vary between species and can also be influenced by genetic, environmental and agronomic factors.³²

Research compiled by Page *et al* (2012) reflects the general industry view that Indian sandalwood has the highest average heartwood oil content of the major commercial sandalwood species (Table Error! No text of specified style in document.-2). The high oil content and the high levels of santanol in Indian sandalwood result in a strong demand for, and a high value of, this species. The comparative heartwood oil concentration of sandalwood from Pacific Islands generally lies somewhere between Indian and Australian sandalwood.

Table Error! No text of specified style in document.-2 Comparison of sandalwood oil content across species

Sandalwood species	Origin	Oil content (%)
<i>Santalum album</i>	India, Indonesia	6-7%
<i>S. yasi</i>	Fiji	5%
<i>S. austrocaledonicum</i>	Vanuatu, New Caledonia	3-5%
<i>S. spicatum</i>	Western Australia	2%
<i>S. lanceolatum</i>	Queensland	1%

Source: Page *et al.* 2012, citing AAG, 2006

3.3. Market prices

The starting point for market prices for sandalwood in Vanuatu is the minimum price payable to landowners for various grades of sandalwood heartwood logs. The VDOF prescribes a set of minimum prices in accordance with Forestry Regulations, and these are reviewed periodically. The current pricing schedule is listed below (Table Error! No text of specified style in document.-3). The purpose of the minimum price is to provide a safeguard for landholders, and the broader national interest, in recognition of the lack of readily available public information on sandalwood prices in export markets.

Table Error! No text of specified style in document.-3 Minimum prices for various grades of sandalwood heartwood, 2016

Sandalwood log grades	Minimum price (Vatu/kg)	Minimum price (US\$/kg)
1 st grade heartwood	VT 4000	35-40
2 nd grade heartwood	VT 3000	25-30
3 rd grade heartwood	VT 2000	15-20

³⁰ Thomson L.A.J. (2008). Revitalizing Pacific sandalwood production. *Non-Wood News* 17, 3–4.

³¹ Page, *et al.* (2012), *ibid.*

³² Page, *et al.* (2012), *ibid.*

Source: Republic of Vanuatu, Forestry (2016 Sandalwood Harvesting Season) Order, April 2016; Exchange rates based on OANDA rates for early December 2016.

In 2010, the VDOF reported the total quantity of sandalwood harvested over the period from 2008 to 2010 was around 261 metric tonnes, and the money earned by the land holders (resource owners) was VT233 million (around US\$ 2.1 million in 2016 dollars)³³. This equated to approximately VT 1000/kg, (or US\$ 10/kg) which was the minimum royalty rate at that time. This suggests that average prices received by landowners have been close to (or not substantially more than) the minimum prices prescribed by the VDOF.

The current minimum prices of VT 2000 – 4000/kg equate to approximately US\$18 – 38/kg. The VDOF 2016 Sandalwood Harvest Record shows royalties of VT 24,461,700 (around US\$230,000) were paid for total exports of around 10,998 kg³⁴; representing an average of around US\$ 21/kg or US\$ 21,000/tonne, which was paid as royalties for heartwood logs³⁵.

These prices are broadly aligned with guidance provided in ACIAR’s study in 2012 on opportunities for the smallholder sandalwood industry in Vanuatu, which incorporated a review of the value of plantation sandalwood. The ACIAR analysis noted preliminary forward estimates for the future value of plantation sandalwood from Australia ranged from A\$20,000 to A\$41,000 per tonne for Indian sandalwood (*S. album*) and A\$3,000 to A\$16,500 per tonne for Australian sandalwood (*S. spicatum*)³⁶. Indufor understands the ACIAR estimates for Australian plantation sandalwood were based on logs containing heartwood *and* sapwood, while the Vanuatu sandalwood prices are for heartwood only.

Page et al (2012) observed that Vanuatu sandalwood (*S. austrocaledonicum*) tends to be rated in quality somewhere between Indian and Australian sandalwood, primarily based on its percentage oil yields and quality. On this basis, the study assumed a scale based on a conservatively low market return for Vanuatu sandalwood of A\$10,000 per tonne and a conservative top market value of A\$30,000 per tonne. This represents a price range of around A\$10-30/kg; or approximately US\$8-23/kg.

Indufor has obtained some additional price data for sandalwood products sold by sandalwood licensee to export markets on an FOB basis (Table **Error! No text of specified style in document.-4**). The differential between the minimum price payable to landowners (as prescribed under Vanuatu Forestry regulations) and the export sales prices payable to licensees reflects the costs associated with licensee fees, primary processing or preparation of logs (including removing all sapwood), storage or warehousing, setting up or facilitating sales and other related transaction costs. Indufor notes the export prices below are based on limited data available from only two sandalwood licensees who reported recent prices for export sales.

Table Error! No text of specified style in document.-4 Guidance on prices for Vanuatu sandalwood products

Log grades (clean desapped heartwood)	Minimum price paid to landowners, 'beach price', 2016 (US\$/kg on beach) ¹	Vanuatu export prices for export sales, 2016 (US\$/kg FOB) ²	Alignment of logs with export product grades
1 st grade	30 - 40	50 – 70	Higher prices for large dimension clean logs
2 nd grade	20 - 30	40 – 60	Mixed heartwood billets and clean logs Clean roots and butts
3 rd grade	10 - 20	30 – 50	Mixed heartwood billets and logs Deadwood and mixed heartwood flakes

Sources: (1) Derived from VDOF, using OANDA currency conversions; and (2) Prices derived from sandalwood industry consultation conducted in 2016 – limited data only.

³³ Tate, H. (2010), *Ibid*.

³⁴ VDOF (2017) 2016 Sandalwood Harvest Record. Data provided on request for this project.

³⁵ OANDA Currency Converter, February 2017. Online: <https://www.oanda.com/currency/converter/>

³⁶ Page et al. (2012) *Ibid*.

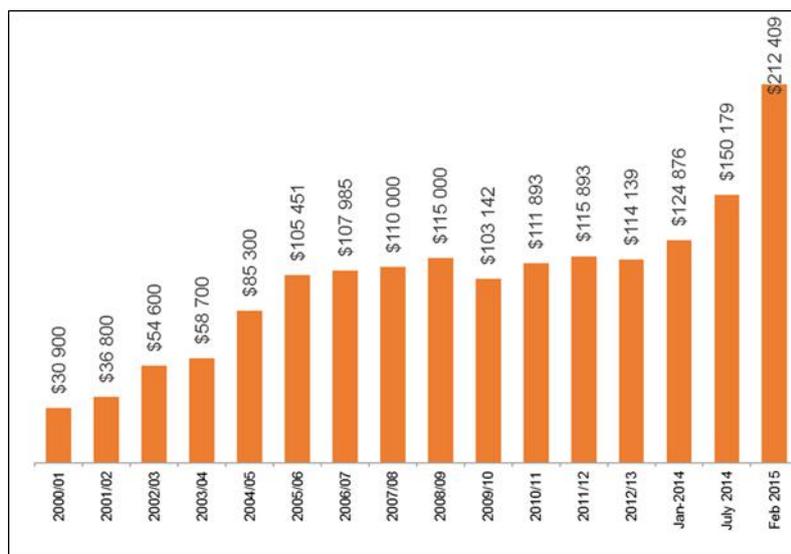
This comparison indicates there may be some profit margin for exporters if they can purchase sandalwood at the minimum price, efficiently segregate the material, incur low transportation, storing and packaging costs and direct each of the grades to their highest value markets. However, the scope for this margin to be realized in Vanuatu is dependent on a range of factors that include market knowledge and efficient access to a range of market outlets.

Comparing these prices in a meaningful way with other international prices is made more complex by the number of variables involved; including for example, the range of different species, the range of end-markets; and the differences in supply chain structures aligned to these end-markets.

For example, the results from regular sandalwood auctions in India are often referred to in market reports. The Government of India controls the export of Indian sandalwood (*S. album*) and oil, and the quantity of wood auctioned every year depends on the extracted stock position. Over the past 15 years, the supply of mature wild sandalwood in India has declined substantially.

Reflective of this declining supply, the sale price of mature wild sandalwood in India is reported to have increased from around A\$30,000 per tonne to over A\$200,000 per tonne³⁷ or A\$200+/kg. However, it is important to recognize the Indian auction prices relate to wild Indian sandalwood, which has been designated as a 'royal tree' in India, and it typically has a higher oil content than plantation grown sandalwood. In this context, industry analysts anticipate the price of sandalwood will continue to rise due to dwindling supplies.

Figure Error! No text of specified style in document.-6 Indian sandalwood heartwood auction prices in India (AU/tonne)



Source: Padmanabha (2016) Expert Sandalwood Market Report for TFS.

Note: Indian auction prices relate to wild Indian sandalwood, which typically has a higher oil content than plantation grown sandalwood. Raw, unprocessed plantation grown sandalwood are expected to sell for considerably lower prices.

The top end of the Indian auction price results is considerably higher than the sandalwood prices paid to Vanuatu landowners. However, the limitations on comparing these prices include:

- the differences in species and India's domestic market preference for wild Indian sandalwood;
- the Indian Government regulations on supply and auction allocations;
- the proximity to highly competitive domestic markets; and

³⁷ Padmanabha, A. (2016) *Ibid*.

- the likely variance in sandalwood production specifications, e.g. log diameters, lengths, proportions of heartwood to sapwood, and average heartwood oil yields.

Any of these factors on their own, or in combination, could give rise to significant variations between ‘market prices’ for Vanuatu sandalwood compared to other sandalwood products and grades.

Notwithstanding the limitations inherent in such price comparisons, there appears to be scope for Vanuatu sandalwood producers (farmers and their agents) to pursue higher prices for their products, through improvements to market information and product differentiation based on quality and the end market, coupled with associated amendments to sales arrangements.

The implications of this for PHAMA and the sandalwood industry in Vanuatu include:

- Further work may be required to establish a consistent set of log grades with specifications that can be compared to other international price benchmarks such as India’s auction prices.
- Further analysis of market benchmarking and competitiveness would require targeting of specific product and end markets, specifically whether logs are directed to carving and religious purposes, or directed to oil production and downstream uses such as ingredients in fine fragrances, therapeutic and medicinal products, and soaps and toiletries; or lower grade markets including attars and incense sticks.

3.4. Industry development and branding

A further aspect of market positioning is the extent to which the Vanuatu sandalwood industry has established consistent standards for supply or a recognized brand. For example, in Australia, the sandalwood industry continues to evolve and introduce systems and processes to improve its market access and market share. Key features of the Western Australian sandalwood industry, encompassing the native sandalwood (wild grown and plantations) and Indian sandalwood (plantation) sectors include:

- ISO standards for the characteristics of the oil of *S. album* and *S. spicatum* (ISO 3518:2002 and ISO 22769:2009 respectively);
- Increasing scale and consolidation of the industry, for example, TFS Corporation acquiring the Mt Romance Sandalwood Factory and associated processing capacity; and Santanol acquiring the plantation interests of Elders Limited;
- Emergence of forest management certification within the industry, for example, the Forest Products Commission of WA and WA Sandalwood Plantations both acquiring and maintaining certification under the Australian Forestry Standard;
- Emergence of regulatory requirements for legality verification for all sandalwood products, with the Forest Products Commission of WA incorporating these requirements in its supply and marketing contracts for *S. spicatum*; and
- Increasing targeting of specific markets, including pharmaceutical applications as well fragrance/cosmetic applications. This includes, for example:
 - TFS acquiring interests in bio-tech/pharmaceutical product development companies, to better position itself for creating or accessing markets for sandalwood products³⁸; and
 - Santanol claiming its oil is produced and tested in its own distillation facility and laboratory ensuring conformity to ISO specifications and stringent worldwide requirements³⁹.

By comparison, the Vanuatu sandalwood industry does not have this level of scale or industry development. This has implications for Vanuatu’s market positioning and capacity to realize a comparable market value when products are sold on a spot basis via traders into global markets.

³⁸ TFS (2016). Online: <http://www.tfsltd.com.au/blog/tfs-acquire-us-pharmaceutical-partners-capture-downstream-revenues-product-sales/>

³⁹ Santanol (2016). Online: <https://santanol.com/product/naturally-pure-oil/>

Indufor had preliminary discussions with industry stakeholders about these issues (Appendix A). This consultation noted a mixed range of views on the need for specific standards and certification for Vanuatu sandalwood. While at one level there was generally broad agreement that it would be good to have internationally recognized standards or certification assurances in place, it was also acknowledged that developing certification programs can be expensive and problematic where demonstrating legal supply is challenging, and where the scale of the industry is relatively small, such as in Vanuatu.⁴⁰ This consideration included certification labels such as Organic and Fair Trade for agricultural commodities – and likewise Forest Stewardship Council (FSC) certification for forest management and timber production. These were generally seen as potentially attractive to international markets; but not the primary challenge or obstacle for individual enterprises or the industry at present.

Furthermore, the consultation highlighted the limited access to market information and the apparent need for a more specific focus on target markets for Vanuatu sandalwood. The need for specific standards and certification will depend largely on the target market. Until target markets are selected, the need for specific standards and certification is unclear.

For example, a comparison of the various market requirements in the fine fragrances, soaps and toiletries segment, and the medicines and pharmaceuticals segment, is outlined below (Figure **Error! No text of specified style in document.-7**). This comparison highlights that generally, the essential commercial requirements are similar – i.e. there is the need to demonstrate product suitability for specific uses; consistency of supply over time; and price competitiveness with other suppliers.

The extent to which there are essential requirements for compliance with specific standards will vary; and relatedly, the extent to which there are other special value propositions that can be used to improve competitiveness in the market will vary. Hence, enterprise decisions on relevant standards should ideally be informed by selected target markets.

Figure Error! No text of specified style in document.-7 Comparison of market requirements for sandalwood products across selected market segments

Fine fragrances, soaps and toiletries		Medicines and pharmaceuticals
Essential commercial requirements:		Essential commercial requirements:
<ul style="list-style-type: none"> • Demonstrated suitability for specific uses • Consistency of supply over time • Competitive on price with other suppliers 	↔	<ul style="list-style-type: none"> • Compliance with specific standards • Consistency of supply over time • Competitive on price with other suppliers
Essential compliance with standards:		Essential compliance with standards:
<ul style="list-style-type: none"> • Potentially nil 	↔	<ul style="list-style-type: none"> • Certified compliance with regulatory standards for specific products, e.g. • Food & Drug Administration (FDA) for US markets • Therapeutic Goods Administration (TGA) regulation in Australia • ISO-based management systems
Special value propositions:		Special value propositions:
<ul style="list-style-type: none"> • Organic production • Indigenous community involvement and celebrated history of cultural importance • Fair Trade or similar form of certification with benefit sharing along supply chain • Distinctive branding that resonates with target customer bases 	↔	<ul style="list-style-type: none"> • Potentially nil

Source: Indufor

⁴⁰ Page, et al. (2012) Ibid.

In this context, the consultation also noted the lack of industry coordination (beyond the VDOF) to bring together the collective effort and funding required to pursue standards development or certification; or more broadly, to develop an industry brand. In the absence of effective industry coordination, the task of establishing certification or a specific brand falls back to individual enterprises, who generally need a certain scale to make these efforts viable.

In either case, this study has observed there are three key steps required for the industry to improve market access for Vanuatu sandalwood. These requirements relate to the need for individual enterprises and the industry more broadly to:

- (i) aggregate the resource base;
- (ii) identify and select target markets; and
- (iii) establish and build a strong brand.

Indufor considers these to be enabling steps towards further industry development and branding, which can provide for a broader suite of sandalwood products and improved market access in both domestic and international markets.

Once these issues are addressed, either by an individual enterprise or the whole industry, further consideration can be given to the need and net benefits of developing specific log grading standards and other forms of standards and certification for sandalwood products.

4. Options for improving market access for sandalwood

4.1. Routes to market

Under the current industry structure in Vanuatu, sandalwood is mostly sold by multiple sandalwood licensees looking to negotiate sales through one-to-one (bilateral) negotiation with international buyers. These sales over recent years have constituted relatively small volumes, typically less than one tonne of sandalwood heartwood; and total sandalwood exports from Vanuatu have reduced to a low ebb of around 12 tonnes in 2016.

This structure for sandalwood sales in recent years has some significant limitations, most notably:

- It is apparent that most Vanuatu sandalwood producers (farmers and their agents) do not know where and how their sandalwood will be used, i.e. they are not engaged in a value chain;
- There is minimal market trade information available to Vanuatu sandalwood producers to inform market access; and
- The fragmented nature of sales by multiple producers presents various challenges for the VDOF to allocate its limited resources to monitoring and regulating industry trade and supporting industry development, including market access.

To improve market access, two alternative routes to market are considered below. These are firstly, establishing regular sandalwood auctions that are administered by the Government of Vanuatu; and secondly, encouraging domestic processing in strategic locations across the country. These options are not mutually exclusive and may be complementary. They are discussed in turn below.

4.2. Establishing sandalwood auctions

The first option is based on establishing a regular auction for Vanuatu sandalwood, at which Vanuatu producers (farmers or their agents including sandalwood licensees) can sell their sandalwood logs via an auction process administered by the Government of Vanuatu (presumably led by VDOF).

The auction could be held on an annual basis, to coincide with the end of the annual harvest season for sandalwood – and international buyers would be invited to inspect the lots for sale during a specified auction period (for example, one week for the viewing of lots and placing bids). It is envisaged the auctions could be held in Port Vila and/or Luganville on Santo, but setting up auction lots on Erromango and Tanna would be considered also.

4.2.1. Features and benefits

The auction design would require careful consideration and detailed planning, which is beyond the scope of this report. Specialist expertise should be engaged to design the process should this be a favourable option for VDOF and PHAMA. However, key features of the auction option include the following:

- *Resource aggregation:* An auction would provide for an increased level of resource aggregation, as merchantable material would be brought together in one centralized location to display sandalwood lots, and prospective buyers can see an aggregated quantity of merchantable material for sale – notwithstanding the supply may continue to be offered for sale in small parcels of various grades.
- *Transparency:* It would improve transparency for market prices achieved via auction, as buyers and sellers would see the bidding process and have access to summary records of winning bids for different grades of sandalwood material. Sandalwood producers (farmers or their agents) would also be able to see the range of buyers in the market, which should improve market information and understanding of market demand and requirements for different grades of sandalwood material.

- *Simplicity and efficiency for producers:* The opportunity for producers (farmers or their agents) to sell via an annual auction may offer a simpler approach than seeking to identify a buyer who will pay the highest price. In theory, the auction price would be the ‘market price’, and producers can be assured they have achieved the market price by selling via auction. Related concerns could be addressed through the auction design process; for example:
 - Potential concerns about the auction not having enough buyers to provide for competitive bidding could be addressed via a reserve price provision; and
 - Potential concerns about auction fees that would reduce the proceeds to producers could be addressed, with scope for the Government of Vanuatu and its program partners to consider waiving seller fees during an auction establishment phase to attract producers and buyers into a competitive auction dynamic.
- *Simplicity and efficiency for buyers:* Similarly, an auction process should represent a relatively simple and efficient way for prospective buyers to purchase Vanuatu sandalwood, through a competitive bidding process. Currently, new buyers need to identify and locate producers and engage directly on a one-on-one basis to obtain information on their sandalwood products, then negotiate on prices. This can be an inefficient process if the buyer is looking to compare the value of alternative supplies; or if the buyer contemplates visiting different producers across the islands.
- *Focus for industry regulation and administration:* An annual auction process would enable VDOF to focus its resources and capacity on specific trade events in specific locations, which could be more cost-effective than monitoring a wide range of bilateral sales arrangements between multiple buyers and sellers across the provinces.
- *Support for a log grading standard:* An annual auction process would likely encourage the development of a standard set of log grades, so that auction lots can be advertised according to specific and consistent grades. Improvements in refining log grade definitions and the consistency of grading should lead to improved market access, because prospective buyers (notably outside Vanuatu) will have a higher level of assurance of the quality of sandalwood they can purchase.

The sale of sandalwood by auction is well established in India, notably in the states of Karnataka, Tamil Nadu and Kerala. In India, the State governments have held ownership of the natural stands of Indian sandalwood (*Santalum album*), and the respective Forest Departments in each state have jurisdictional authority over the rights of extraction and disposal (sale) of sandalwood⁴¹. As a result, sandalwood auctions have been managed by State governments, with the government being the seller and administrator of the process.

Legislative amendments introduced in Karnataka and Tamil Nadu in the early 2000s have paved the way for landowners to be legally entitled to the sandalwood on their land, and for designated State-owned organisations (e.g. Karnataka Soaps and Detergents Limited and Karnataka State Handicrafts Development Corporation) to buy sandalwood directly from the landowners⁴². This is expected to encourage communities and private entrepreneurs to cultivate sandalwood, and may lead to some changes in sandalwood auction arrangements, for example introducing private sellers. However, the long history of sandalwood auctions in India reflect State government controlled sales to date.

Indufor is not aware of other regular sandalwood auctions outside of India. However, there are many and varied examples of auction systems for timber products, including auctions of (or tenders for) ‘special timbers’ held in Australia, for example in Tasmania and Western Australia^{43, 44}. These auctions and tenders are set up to provide opportunities for the State government to sell timbers that have special qualities and are in scarce supply. The lots are generally single parcels of small quantities of wood available arising from harvesting operations. Auctions and tenders are advertised to buyers who may be in other states and potentially overseas, and the prices offered often reflect a broad range of possible end uses and inherent timber values, e.g. artisan production of furniture and musical instruments. While these auctions do not feature sandalwood, there are features of their purpose and design that are relevant to consideration of improving market access

⁴¹ Kumar, A.N., Joshi, G. and Mohan Ram, H. Y. (2012) Sandalwood: history, uses, present status and the future. *Current Science*, Vol. 103, No. 12, 25 December 2012.

⁴² Kumar, et al. (2012) *ibid*.

⁴³ Tasmania example: Island Specialty Timbers – online: <http://www.forestrytas.com.au/shops/ist>

⁴⁴ Western Australia example: <http://www.fpc.wa.gov.au/timberauctions>

for Vanuatu sandalwood. These auction systems, together with the Indian sandalwood auctions, could be used as reference points for Vanuatu.

4.2.2. Limitations

There are limitations and challenges associated with an auction system, which include the following:

- *Resource disaggregation:* While auctions would bring merchantable sandalwood together in one centralized location to display sandalwood lots for sale, it would not directly support the aggregation of scale within enterprises, in a way that could underpin the further development of scale economies or establishment of domestic processing. As noted above, the establishment of auctions would not inherently prevent domestic processing, but it would create a facility for the ongoing sale of individual parcels of logs and the export of logs to international customers.
- *Lack of value chain development:* An auction process may not improve the current situation in which Vanuatu sandalwood producers (farmers or their licensee agents) are selling sandalwood without a clear understanding of where and how the sandalwood will be used. As noted above, this lack of market information means that producers are foregoing the opportunity to be producing and presenting their sandalwood specifically for target markets. The sale of Vanuatu sandalwood log through auctions would likely result in buyers continuing to purchase sandalwood logs on a spot basis, with no obligation to provide guidance on downstream processing or use, or future sales. However, this situation would be no worse than the current situation of bilateral sales negotiations between producers and buyers. Furthermore, market intelligence can be prepared to assist the supply chain to better understand market drivers.
- *Critical mass requirements:* To realise competitive bidding and sale outcomes, an auction sale will require some level of scale in the number of sellers and quantities of sandalwood for sale to attract multiple buyers, ideally interested in buying sandalwood across a range of grades. The thresholds for scale requirements are not fixed and will depend on a range of factors over time. In theory, the more sandalwood that can be offered for sale, the more market/buyer interest there will be. International buyers may be looking to purchase enough sandalwood to fill container shipments; otherwise, higher freight charges will reduce the willingness to pay for sandalwood material. However, Indufor also notes that some buyers of Vanuatu sandalwood are prepared to buy sandalwood in relatively small consignments that can be transported via air cargo to Asian markets. This reflects the level of interest in high quality sandalwood material.
- *Security and related governance issues:* Depending on the design of the auction, sandalwood producers (farmers and their agents) may be required to bring their sandalwood into a centralised storage facility, where it would be held for inspection and processing over a period around the auction. This raises issues of security and related governance issues, which could be addressed through the auction design process, but may still give rise to concerns for producers who are more comfortable with direct sales.

In summary, a sandalwood auction process will not directly aggregate the resource base; identify and select target markets; or establish and build a strong brand. **However, a sandalwood auction process could significantly improve market access beyond existing arrangements, through a Government-administered process that could be readily implemented with support from the Government of Vanuatu and potentially programs such as PHAMA.**

Also, as noted above, establishing an auction system could be complementary to encouraging domestic processing; the merits and limitations of which are discussed below.

4.3. Encouraging domestic processing

Domestic processing was a key objective of Vanuatu's Sandalwood Policy in 2002, and is reflected in subsequent government policies and regulations, including the *Industrial Development Act* 2014. However, despite some concerted efforts to establish domestic processing for the distillation of sandalwood oil, particularly during the mid- to late 2000s, most of Vanuatu's sandalwood exports have been sold as unprocessed (clean heartwood) logs.

4.3.1. Features and benefits

The benefits of domestic processing for the sandalwood industry and the Vanuatu economy would be:

1. *Aggregation of the resource base:* The establishment of domestic processing cluster/s could facilitate an aggregation of supply of resource, which affords economies of scale, which in turn affords increasing market information and understanding of the value of sandalwood products;
2. *Supply chain efficiencies:* In theory, the processing of logs in country should reduce shipping costs associated with transporting logs to processors overseas; and provide scope for Vanuatu producers to capture any margins from processing of raw resources into processed products;
3. *Building a brand:* The consolidation of the resource base and production of (value added) products should provide a platform to develop a stronger market brand for Vanuatu Sandalwood, and 'branded' products, by comparison to separate transaction sales of unmarked logs;
4. *Local employment and upskilling:* The establishment of domestic processing cluster should provide an investment case involving increased employment and upskilling within Vanuatu.

The economic rationale for domestic processing does not always prevail in competitive global markets, where it may be more efficient for logs to be processed in another location or country – in which case, efficiency gains along the value chain should in theory be passed back to producers. In this case, the opportunity cost for Vanuatu producers could be quite low; whereas the risk that downstream processors in other countries would capture all the efficiency gains is considered relatively high. That is, the employment related benefits and training opportunities afforded by domestic processing of sandalwood in Vanuatu could exceed the opportunities otherwise available to local men and women, particularly in areas outside the main centres of Port Vila and Luganville.

Furthermore, there are existing examples of domestic processing of Sandalwood oil in Vanuatu, which demonstrate the capacity and know-how for production. The Summit based in Port Vila and the Pacific Provender, which was previously based on Erromango but now based on Malo, Santo, have steam distillation facilities to process relatively small batches of sandalwood material. Both facilities are small-scale, currently processing less than 2-3 tonnes of sandalwood per year. However, they both employ 5+ local staff to assist with sandalwood processing operations, and this provides a net positive contribution to employment compared to exporting this material as logs. Industry consultation for this review has indicated there is a willingness and capacity to scale up these operations, subject to a range of factors including access to an aggregated resource base, and licensing requirements.

In addition, there are existing examples of domestic processing of similar products, e.g. the extraction of Tamanu oil from Tamanu trees (*Calophyllum inophyllum*) on Malekula to produce a broad range of skin-care cosmetics sold to domestic and export markets. This example provides an interesting case study, presented in Box 2 below.

Examples of this nature suggest scope for the sandalwood industry to engage further with other essential oils producers in Vanuatu and look at opportunities for working together to strengthen market access and enhance the brand of Vanuatu products. Nangai oil (*Canarium indicum*), also referred to as Canarium or Ngali nut, is another Vanuatu product that shares similar challenges associated with domestic processing and marketing; and further consideration could be given to the alignment of industry production and marketing initiatives, particularly in targeting selected markets such as essential oils distributors in Australia or New Zealand, or therapeutic product markets in the US.

Box 2 Case study: Nuts and oils in Vanuatu

The processing of Tamanu oil on Malekula provides a relevant example of domestic processing of natural oils in Vanuatu. Tamanu oil is used in a range of skin-care cosmetics, both in Vanuatu and an increasing array of international markets.

Tamanu trees (*Calophyllum inophyllum*) grow across the archipelago, and the nuts are harvested by landowners and locals during the cooler months between June and August. Once harvested, landowners and locals sell either the uncured or cured nuts to Nuts and Oils Vanuatu, which has a factory at Lakatoro on Malekula. The factory has its own curing processes, including large portal racks for drying during the day, and infra-red lamps for use at night. The curing process is essential to the production of high quality Tamanu oil.

Once curing is completed, the nuts are graded and stored before further processing, which incorporates cold pressing to extract the oil. The oil is then filtered through sieves, and the solids captured in the sieves settle over time to produce a dry cream. This Tamanu nut cream can be used as a topical treatment of various skin conditions.

The largest volume of Tamanu oil is reportedly sold in bulk into the US market, where it is used by pharmaceutical formulators who generally blend the oil with other ingredients. Tamanu oil is also used as a base component for local cosmetic creams and soaps, which are sold through an entity that markets the products to boutique markets in Vanuatu and Australia.

Source: Based on article by Ana Terry and Don Hunter for Island Spirit, Issue 77, January 2017.

4.3.2. Limitations

There are some significant limitations and challenges associated with encouraging domestic processing. First and foremost, there is the challenge of demonstrating the financial and socio-economic returns from producing sandalwood oil would match or exceed the returns from exporting the wood. This analysis is challenged by a lack of comparable industry data, combined with numerous production variables and other enterprise-level variables. Recent market research reports have observed the international market for sandalwood is thinly-traded and highly opaque⁴⁵. This constrains the extent to which the domestic processing business case can be readily assessed against exporting wood only.

One example of publicly reported price data on sandalwood oil trade is the September 2016 announcement by TFS Corporation in Australia (now 'Quintis') of a five-year supply agreement with Young Living; one of the largest essential oil producers and distributors in the USA. TFS reported an agreed price of US\$4,500 per kg of plantation grown Indian sandalwood (*S. album*) oil⁴⁶. This price was considerable higher than TFS's earlier market guidance in August 2015, which assumed an increase in the assumed future sales price for TFS' sandalwood oil, from US\$2 500 per kg to US\$2 800 per kg⁴⁷.

TFS/Quintis' long term supply agreements have recently come under considerable scrutiny, as part of a broader market assessment of the value of Quintis' Indian sandalwood assets. The US-based Glaucus Research Group has pointed to Indian Customs data over the past three years, which indicates the weighted average price for sandalwood oil in 2016 was around US\$715 per kg⁴⁸; significantly below TFS's 2015 future price guidance of US\$2 800 per kg, and much less than the TFS-Young Living price.

Another source of publicly available price information for sandalwood oil is the Western Australian Government Department of Environment and Conservation (DEC) reporting to a State Parliamentary Inquiry into the sandalwood industry in WA, which was conducted between 2012 and 2014. DEC's comprehensive submission to the inquiry included market prices for WA sandalwood (*S. spicatum*) logs and oil; and the quoted oil price based on WA Government sales in 2012 was AU\$1,100 per kg⁴⁹; that is, indicatively around US\$800-900/kg. This price data is now over four years old, and sandalwood log prices have generally increased since;

⁴⁵ Glaucus Research Group (2017) *Market Research Investment Opinion: TFS Corporation / Quintis*. Published 22 March 2017.

⁴⁶ TFS (2016) *TFS signs supply agreement with world's leading essential oil company*. ASX Release, 2 September 2016.

⁴⁷ TFS (2015) *Full year profit and Cash EBITDA ahead of guidance*. 31 August 2015.

⁴⁸ Glaucus Research Group (2017) *ibid*.

⁴⁹ WA Government Department of Environment and Conservation (2012) *Submission to the Standing Committee on Environment and Public Affairs – Inquiry into the Sandalwood Industry in Western Australia*. Submission on 22 October 2012.

but in the absence of more recent government data, the DEC prices provides some reliable guidance from the last five years for comparative purposes.

Indufor sought pricing information on Vanuatu sandalwood oil exports during this review, but availability of reliable guidance was constrained by the lack of continuity in production (previous processing operations ceased some years ago and recent start-ups have only just started producing small batches of sandalwood oil); the small-scale nature of operations; and commercial in confidence considerations. Further work would be required to test and compare the prices that could be achieved for Vanuatu sandalwood oil in international markets.

The range of prices referred to above suggests that international market prices for Vanuatu sandalwood oil could potentially be in the range of US\$750 to US\$1 500/kg, depending on how the oil is graded and presented.

To compare these sandalwood oil prices with the farm gate or 'beach price' for sandalwood heartwood logs, the yield of oil needs to be considered. Assuming the oil content of Vanuatu sandalwood plantation trees (aged 20+ year old) is nominally 3.5%⁵⁰, this would suggest the equivalent value of plantation heartwood (2nd and 3rd grade logs) could be between US\$25/kg and US\$50/kg. This derived price range sits above the prices currently paid by sandalwood licensees to landowners (refer Table **Error! No text of specified style in document.**-4 - US\$10-30/kg for 2nd and 3rd grade logs), and close to the prices quoted by some sandalwood licensees exporting heartwood logs on an FOB basis (US\$30-60/kg).

This derivation of prices for domestic processing operations does not take account of production and marketing cost factors, which include:

- transportation costs for sandalwood material sent to a centralized processing facility;
- log handling and storage costs;
- sandalwood chipping and distillation costs;
- bottling and packaging costs;
- sales and marketing costs, distribution and administration costs; and
- some reasonable level of profit margin for the enterprise to be viable.

Recognising the unit costs associated with these factors could be substantial, the price that could be reasonably paid to landowners for sandalwood heartwood logs may need to be considerably less than the equivalent value of sandalwood oil. **Based on this indicative price derivation, the financial returns and value from domestic processing of sandalwood oil could be marginal at best compared to export sales of heartwood logs; particularly in the absence of a distinctive brand for the oil products.** It is important that sandalwood growers should receive returns commensurate to export markets, and domestic processors need to develop competitive supply chains.

These price derivations are illustrative only and not intended to represent definitive guidance on the value differential between sandalwood logs and sandalwood oil. To compare sandalwood log and sandalwood oil prices more rigorously, further analysis would need to be done on an enterprise level to compare and reconcile specific differences in a range of factors that include:

- *Species*: The prices for sandalwood oil referred to above relate to Indian sandalwood (*S. album*) and WA sandalwood (*S. spicatum*), and the differences in oil yields, quality and market preferences would need to be tested and validated;
- *Log grades*: To produce sandalwood oil, there would need to be specific alignment of grades of logs, and prices for these log grades. Note the Indian sandalwood auction prices, for example, relate to wild Indian sandalwood which have a higher oil content than plantation grown sandalwood of any species; while variations in log dimensions will impact on value recovery;
- *Operating scale*: The operating scale will generally have a significant impact on cost structures, and references to oil production in Australia, for example, relate to operating scales that are considerably larger than the wood supply and oil distillation operations in Vanuatu;

⁵⁰ Page et al. (2012) *ibid*; citing AAG, 2006.

- *Operating standards:* The standards that are applied to oil production processes can also have a significant impact on costs;
- *Target markets and oil standards:* Related to the operating standards, the price paid for sandalwood oil will depend largely on the intended market, and standards associated with those markets – for example, the specifications required for therapeutic and medicinal uses will be quite stringent, and potentially quite different to the requirements for aromatherapy uses;
- *Input costs:* The cost of power (electricity, gas or other forms of energy) can have a significant impact on costs, and industry representatives in Vanuatu observed energy costs in Vanuatu can be among the most expensive in the world on a unit basis; and
- *Supply chain relationships:* The prices realised for sandalwood logs and sandalwood oil can reflect the nature of supply chain relationships and strategic positioning in target markets – for example, a long-term agreement such as the five-year supply deal between TFS/Quintis and Young Living, will likely give rise to different pricing structures to a one-off spot sale between independent parties.

These types of factors will vary considerably across different enterprises, particularly considering the differences in scales and cost structures between Vanuatu and countries such as Australia.

Renewed focus on the potential for domestic processing should not exclude the selling some sandalwood material in unprocessed log form, where this would realise a higher value and provide for a complementary range of sandalwood products. For example, carving logs typically attract premium prices and can generate significantly more value when sold as logs. The extent to which Vanuatu's sandalwood industry will continue to produce carving logs is unclear, as the wild grown sandalwood resource has been largely picked over, and sandalwood plantations grown for up to 20 years may not achieve the size and other characteristics required to realise carving logs. However, domestic processing operations should seek to optimise value from available resources, which may include segregation of logs and other material that is best exported directly. A desired outcome from domestic processing is the domestic processors are paying a price commensurate to what a grower might receive in alternative markets. This provides the basis for the options of establishing an auction system which is supported by growers, and encouraging domestic processing to be complementary through offering a competitive alternative market.

Other limitations and challenges associated with encouraging domestic processing include:

- *Resource aggregation:* There are clearly challenges for prospective investors in aggregating sufficient scale to establish a domestic processing facility with scale economies to compete in international markets. As noted above, the total harvest and export of sandalwood heartwood was less than 12 tonnes in 2016, which reflects the fragmented resource base and an industry still in transition from the natural stands to the planted sandalwood resource, which is yet to reach maturity;
- *Financial capital requirements:* Securing and servicing the financial capital to establish processing facilities, such as small factories or sheds with distillation equipment and systems; storage facilities for inputs (sandalwood heartwood) and products (such as powders or oils); packaging and branding equipment, materials and systems; and utility services such as power, which is widely acknowledged as relatively expensive compared to other countries that are processing sandalwood (e.g. Australia and China); and
- *Skilled personnel requirements:* Securing and supporting skilled personnel to operate the facilities in such a way they can be cost competitive to supply value added products into target markets. There are examples of sandalwood processing facilities already established in Vanuatu, and the Nuts and Oils Vanuatu case study presented above (Box 1), which show that personnel can be trained to provide specialist expertise. However, recognising there has been minimal investment in domestic processing to date, it is important to recognise the limitations and challenges of securing and maintaining the services of personnel that can support a cost effective sandalwood processing facility in Vanuatu over the medium to long term.

These other limitations and challenges can be largely addressed, if the proponents of domestic processing can assure sandalwood producers of reasonably price parity with export sales of heartwood, based on the financial and socio-economic returns from producing sandalwood oil.

5. Conclusions and next steps

5.1. Industry status

The sandalwood industry in Vanuatu is currently in a state of uneasy transition, from its long history of harvesting and exporting the wild grown sandalwood (*S. austrocaledonicum*), to a new future based principally on managing and harvesting planted sandalwood, which have been established across the islands over the past 15 years. The earliest plantings will reach maturity over the next five years and harvesting is expected to increase thereafter.

In addition to this major shift in the resource base, the industry structure is currently in a state of flux. A decade ago, there were two licensees who managed all export sales and some domestic processing. Since then, regulatory reform has sought to enable a more open industry in which smallholder farmers can sell their sandalwood trees and logs directly, or via one of 15+ licence holders in Vanuatu. Only a proportion of these licence holders are active year-to-year; and domestic processing is minimal.

Meanwhile, international markets continue to evolve. Global demand is expected to increase over the next 15 years. This growth will be underpinned by economic growth in China and India, where there is strong demand for sandalwood across a range of traditional uses; as well as the ongoing development of new markets for fine fragrances, medicines and therapeutic goods, and soaps and toiletries in countries such as the US and Europe, as well as Australia and New Zealand.

The supply of wild grown sandalwood is diminishing worldwide, but plantation resources are maturing, most notably in Australia, which has an extensive planted estate of Indian sandalwood and WA sandalwood. The key challenge for suppliers in countries including Vanuatu will be positioning to meet the specific requirements of target market segments, through compliance with specific stringent standards; or special value propositions based on the country of origin or other forms of certification. Vanuatu is looking now to establish a stronger position, at a time when its production and exports are at their lowest ebb.

While sandalwood exports from Vanuatu over the past 15 years have been at significantly lower levels than previous periods of exploitation, sandalwood continues to be an important crop given its high value and alignment to existing lifestyles. Further to this, sandalwood is one of the only crops that generates income in the remotest areas of the islands, thus supporting livelihoods for these communities.

5.2. Proposed activities

Based on the review presented above, the following activities are proposed to improve market access for Vanuatu Sandalwood.

These activities are listed in a proposed order of consideration, as for example, the first activity may assist in conducting the second activity, and so forth. However, the sequencing of activities is not necessarily linear and there is scope to implement some activities without implementing all the activities.

Figure Error! No text of specified style in document.-8 Proposed activities to improve market access for Vanuatu sandalwood industry

Proposed activities	Market access benefits	Potential next steps
1. Facilitate establishment of a sandalwood industry forum, which could be convened in	<ul style="list-style-type: none"> • Use industry forum to actively engage with industry on market access issues requiring coordination e.g. <ul style="list-style-type: none"> ○ aggregating resource base to increase market options 	<ul style="list-style-type: none"> • Convene first forum to discuss market access issues and sector priorities • Consider engagement with essential oils producers in Vanuatu for lessons learned input on trade development • Consider opportunity to invite

Port Vila on a regular basis	<ul style="list-style-type: none"> ○ developing standards and certification and/or a Vanuatu brand 	international buyer to present on market requirements, e.g. a leading essential oil buyer in Australia or New Zealand
2. Support VDOF to establish a working group to consider the development of a Government-administered auction for sandalwood logs	<ul style="list-style-type: none"> • Resource aggregation for producers and prospective buyers • Increased transparency and market information for producers 	<ul style="list-style-type: none"> • Engage with VDOF and other Government agencies as required on the potential benefits and regulatory scope • Use first industry forum (above) to discuss scope and stakeholder perspectives on establishing auctions
3. Support VDOF to provide further encouragement for domestic processing, by minimising inadvertent regulatory constraints on further investment	<ul style="list-style-type: none"> • Strengthen enabling conditions for investors to increase their scale of production and access essential oils markets, such as in Australia and New Zealand, which may have proximity advantages 	<ul style="list-style-type: none"> • Conduct joint review with VDOF -and potentially the Vanuatu Department of Industry and Commerce - of regulatory settings to facilitate appropriate investment in domestic processing • Engage stakeholders and offer PHAMA business management support for investment supporting market access
4. Conduct further investigation to better understand current end-markets and alternate market opportunities for Vanuatu sandalwood	<ul style="list-style-type: none"> • Increase the level of understanding of entire supply chains and value chains associated with Vanuatu sandalwood, across selected market segments • Identify potential scope for improving returns based on knowledge of end-markets and possible amended sales arrangements. • Enhance understanding of market requirements and buyer networks 	<ul style="list-style-type: none"> • Conduct further market investigations to understand specific end-markets of Vanuatu sandalwood in New Caledonia, Australia, New Zealand and China, through further engagement with buyers and downstream processors • Scope the potential for alternative sandalwood buyers/markets with a potential interest in Vanuatu sandalwood and associated products • Establish linkages between potential buyers and Vanuatu sandalwood industry representatives, including the scope for market research and trade missions
5. Provide business support functions for industry enterprises seeking to establish market access for sandalwood exports	<ul style="list-style-type: none"> • Enhance prospects for establishing export markets for processed products (or high value products such as carving woods) 	<ul style="list-style-type: none"> • Provide support where business plans exist that require specific inputs, e.g. technical expertise to consider establishing or expanding processing capacity; feasibility assessments for investment in processing technologies; and assistance with applications for grants and loans • Provide support to assist sandalwood producers in developing direct buyer linkages overseas, pending the development of any auction system
6. Support the establishment of	<ul style="list-style-type: none"> • Increase scope to test and demonstrate quality of Vanuatu 	<ul style="list-style-type: none"> • Work with VDOF and appropriate authorities to develop testing capacity for

sandalwood oil testing capacity in Vanuatu and/or through international affiliations	sandalwood, to address risk of downgrading product value <ul style="list-style-type: none"> • capture margins along the value chain for essential oil products 	sandalwood oil <ul style="list-style-type: none"> • Offer support for testing of oil quality from smallholder sandalwood interests, in target markets for oil products
7. Support VDOF to establish a public sandalwood register, which can be cross-referenced to VDOF harvest registers and export permits	<ul style="list-style-type: none"> • Improve market perceptions of industry transparency and sustainability in Vanuatu • Reduce investment risk and this constraint on further investment • Facilitate more effective monitoring and enforcement of regulations and provide a basis for demonstration of product origin, as required in certain markets 	<ul style="list-style-type: none"> • Facilitate Government initiative – through VDOF and potentially the Vanuatu Department of Lands – to design and develop a ‘live’ public record of the Sandalwood Register, with functionality to cross-reference regulated harvest and export activities
8. Support VDOF in providing extension to grower associations, e.g. through development of log grading guidelines to support grower focus on aligning products with market preferences	<ul style="list-style-type: none"> • Build on ongoing ACIAR work to ensure smallholder activities are aligned with maximising market value of planted resource, e.g. <ul style="list-style-type: none"> ○ harvesting at optimal time for heartwood yield (i.e. not too early) ○ presenting clean logs that conform to different buyer requirements ○ encouraging supply aggregation such as grower associations 	<ul style="list-style-type: none"> • Scope development of log grading guidelines, through further engagement with leading buyers of sandalwood heartwood logs • Support ACIAR to strengthen VDOF extension activities through provision of market-oriented training and guidance, e.g. use of log grading guidelines to demonstrate market preference and maximising value of planted resource

5.1. Next steps

Subject to further stakeholder input on the above proposed activities and resourcing constraints, it is recommended that PHAMA, the Vanuatu sandalwood industry and partners proceed with support for three immediate priorities, which are key enabling activities to improve market access. These activities comprise:

1. Facilitating the establishment of a sandalwood industry forum;
2. Supporting VDOF to establish a working group to consider the development of a Government-administered auction for sandalwood logs; and
3. Supporting VDOF to provide further encouragement for domestic processing, by minimising inadvertent regulatory constraints on further investment.

The industry’s response to and support for these activities will provide important feedback on the level of industry interest in collaborative efforts and the potential for market access benefits to arise from providing further program support via other proposed activities.

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Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

Appendix A

Stakeholder consultation

Contacts	Organisation	Meetings
Hannington Tate	Department of Forests	16/11/16; 1/2/17
Watson Lui	Department of Forests	1/2/17
Dick Tomker	Department of Forests	30/1/17
Godfrey Bome	Department of Forests	17/11/16
Judy Daing Kalotap	Department of Forests	17/11/16
Sam Chanel	Department of Forests	17/11/16
Willie Lava	Farmer in East Efate	17/11/16
Jeff Allen	Pacific Provender	2/2/17
Jonathan Naupa	Sandalwood licensee	18/11/16
Livo Mele	Sandalwood licensee	14/11/16
Samuel Kaltak	Sandalwood licensee	18/11/16
Michael Chen	Sandalwood Passion	17/11/16
Jim Batty	South Pacific Sandalwood	14,11/16, 3/2/17
Tony Page	University of the Sunshine Coast	By email

Appendix B

Summary of industry strengths, opportunities, weaknesses and threats

Reporting on strengths and opportunities (2012)	Status (2016)
The exotic images associated with Vanuatu, if coupled with certified sustainable production practices, organic certification and/or Fairtrade certification, could be developed as the basis of niche marketing strategies in high-value markets. ^{a, b}	●●●
Research and development programs are being undertaken to improve product quality and promote industry investment and growth. ^a	●●●
The industry has detailed knowledge of the local species based on research over previous decade, including an understanding of certain chemotypes and alignment with standards. ^b	●●●
Vanuatu sandalwood is readily accepted in European and Arab markets. ^b	●●●
Opportunity for collaboration to establish internationally recognized standards. ^b	●●●
Collaboration with other Pacific Island neighbours to coordinate and share information to establish the Pacific region as second largest producers of sandalwood (after Australia). ^b	●●●
Vanuatu sandalwood is currently perceived as being of higher quality than <i>S. spicatum</i> . ^a	●●
A unique natural and cultural environment and vibrant tourism industry in Vanuatu may offer domestic marketing opportunities (e.g. agritourism and 'suitcase export' of locally made goods). ^a	●●
Linkages are evident among many key stakeholders (government and private sector). The consideration of issues of common concern presents an opportunity for the establishment of an industry peak body. ^a	●●
An available land resource exists that is conducive to sustainable production. ^{a, b}	●●
Production of locally made products using sandalwood could be viable, sold via existing retail outlets or within an agritourism, Mt Romance type facility in or near Port Vila. ^a	●●
The sandalwood industry can 'partner' with other Vanuatu industries (e.g. tourism) in activities such as the development of promotional programs and branding. ^a	●●
Sandalwood prices in Vanuatu increased steadily between 2000 and 2010, and were largely unaffected by the Global Financial Crisis. ^b	●●
Industry priorities have been defined within a sandalwood policy. ^a	●
The industry is regulated and controlled. ^b	●
Pre-existing commercial-sector investment and processing infrastructure exist. ^a	●
Local people have experience in commercial production and processing techniques. ^a	●
There are no major disease risks for sandalwood in Vanuatu. ^b	●
Total supply is forecast to rise, from processed annual quota of 80 tonnes in 2010, to reach around 300 tonnes by 2020 (based on 2010 plantation growth and yield forecasts). ^b	●
Opportunity to investigate hybridization of <i>S. album</i> and <i>S. austrocaledonicum</i> . ^b	●
Tourism projects integrating sandalwood oil and sustainably managed environments. ^b	●

Source: *Perspectives derived from (a) Page et. al., 2012; and (b) Naupa, J. 2010. Reordered by status.*

- Preliminary view on current relevance to market access is considered high
- Preliminary view on current relevance to market access is considered moderate
- Current relevance to market access is considered low relative to other key factors

Reporting on weaknesses and threats (2012)	Status (2016)
4. No Vanuatu sandalwood industry peak body or strategic plan currently exists. ^a	●●●
5. Large volumes of plantation sandalwood from Australia will likely enter the markets from 2014 onwards. ^a	●●●
6. Vanuatu has high internal transport costs and geographical isolation from large markets. ^{a, b}	●●●
7. Unique economic and social challenges exist at the interface between the 'traditional economy' and the 'modern economy'. ^a	●●●
8. No industry grade standards or certification protocols have been determined or implemented. ^{a, b}	●●●
9. Unrealistically high expectation of processes and performance of Vanuatu on world stage. ^b	●●●
10. Poor marketing strategies that can adversely impact on the reputation of certified oil. ^b	●●●
11. The declining natural resource is reducing the size of the Vanuatu sandalwood industry, which will reduce Vanuatu's market presence in the short to medium term until more substantial volumes of plantation sandalwood come on line. ^a	●●
12. The size and value of the current and projected resource in Vanuatu limit production and marketing options relative to high-volume producers. ^a	●●
13. Vanuatu's very small size means limited economies of scale in purchasing, processing, distribution and marketing. ^a	●●
14. Natural disasters such as cyclones can cause significant production disruptions. ^{a, b}	●●
15. There has been limited investment in market research and development to date. ^a	●●
16. The risk of policy changes impacting on private sector investment. ^b	●●
17. Lack of funds that are committed to the planting of sandalwood by the government. ^b	●●
18. Theft of young sandalwood trees and seedlings. ^b	●●
19. Poor planting practices, removal of top soil and erosion. ^b	●
20. There are likely to be regulatory and technical challenges associated with the 'merging' of native and plantation systems. ^{a, b}	●
21. Introduction of other sandalwood species potentially threatens the genetic purity of the Vanuatu resource and limits the opportunity for differentiation in the market relative to higher volume Indian and Australian species. ^a	●
22. Vanuatu's small domestic population limits domestic marketing opportunities relative to Australia. ^a	●
23. Land ownership constraints can inhibit investor confidence ^{a, b}	●
24. Introduced foreign species (<i>S. album</i>) and lack of genetic diversity in better chemotypes. ^b	●
25. Disease arriving, especially in populations with limited genetic diversity. ^b	●
26. Competition for land from other crops, e.g. oil palm. ^b	●

Source: *Perspectives derived from (a) Page et. al., 2012; and (b) Naupa, J. 2010. Reordered by status.*

●●● *Preliminary view on current relevance to market access is considered high*

●● *Preliminary view on current relevance to market access is considered moderate*

● *Current relevance to market access is considered low relative to other key factors*