European Commission

VCA4D
VALUE CHAIN ANALYSIS FOR DEVELOPMENT

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Vanilla value chain in Papua New Guinea

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural development fits within market dynamics. They permit an assessment of the value chains' impact on smallholders and businesses.

The European Commission has developed a standardised methodological framework for analysis. It aims to understand to what extent the value chain allows for inclusive growth and whether it is both socially and environmentally sustainable.

The value chain context

The vanilla world market is a small niche market with an annual global demand of 2,000 to 3,000 t, of which 80% is normally produced in Madagascar. Smaller producers are India, Indonesia, Uganda, Mexico and Papua New Guinea (PNG). PNG contributed around 10% of global production (240 t) in 2018 and an estimated 80% is produced in the East Sepik province (figure 2) in Maprik and Ambunti-Dreikikir districts. Two species are grown (Vanilla tahitensis; Vanilla planifolia) and virtually exclusively produced for export of whole cured beans, processed by the growers. High quality, A grade beans are exported to North America, Europe and Australasia . Lower grades are exported to Indonesia and other Asian countries. The vanilla value chain (VC) is small compared to PNG's major export crops but contributes to poverty reduction for the estimated 17,000 smallholder producers living in remote areas. In addition, the domestic part of the VC supports numerous informal traders, exporters and service providers such as freight forwarders and airlines.

The European Union intervention

The EU project on Rural Entrepreneurship, Investment and Trade aims to improve sustainable and inclusive economic development and job creation, initially in East Sepik and Sandaun provinces (the major vanilla producing areas), with a specific focus on women, youth, and climate change. A mix of hard (energy and transports) and soft (financing, training, market access, digital technologies) components aims to contribute to an enabling business environment and to stimulate climate-resilient rural development.

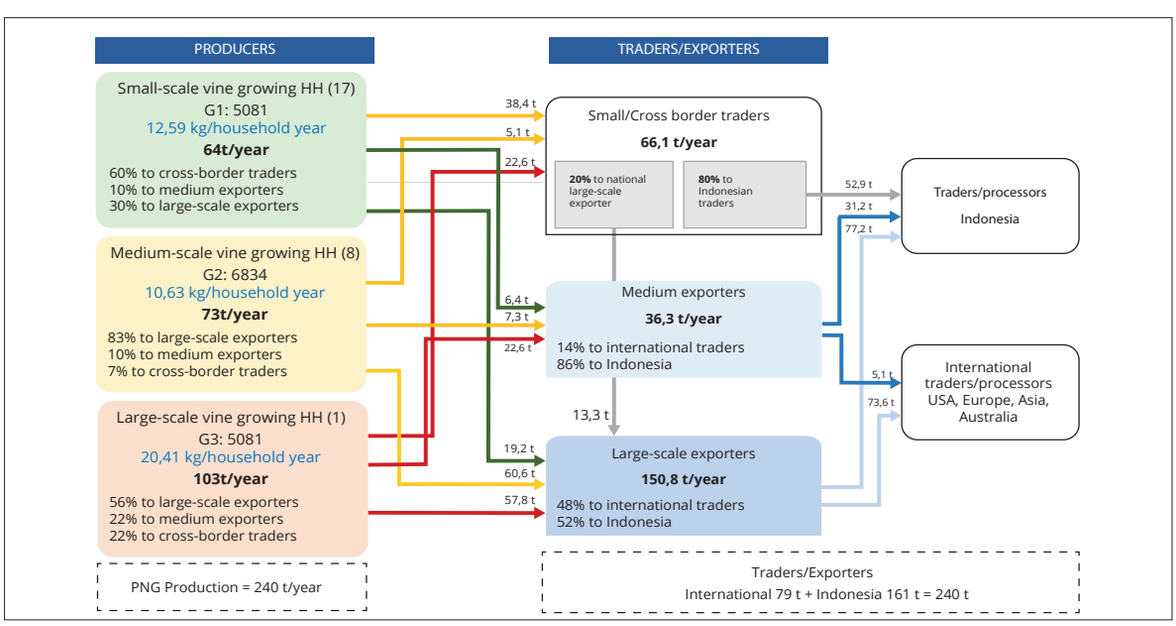

Figure 1 : Mapping of the vanilla value chain in Papua New Guinea

Functional analysis

Production, processing and trade

Vanilla is an **extremely labour-intensive crop** grown without purchased inputs and cured using very simple equipment. The maximum cultivated area is 5 ha per household, the average being under 2 ha. **There are three scales of producers: small-scale vine owning households,** who supply 27% of production; vines tend to be well looked after and produce a relatively good average yield, but only 22% are 'A' grade; the unit value of sales is the lowest; **medium-scale vine owning households** with an average of 600 vines supply 30% of production, have the lowest average production, possibly due to the higher labour requirement to look after this number of vines (no harvesting all the vines) and/or less availability of mulch - the main determinant of yield. However, their cured bean quality is very good; a high proportion are 'A' grade and the average price received is the highest; and **large-scale vine owning households,** averaging 1,700 vines but as little as 25% of the vines may be actively managed; however, the cured bean quality is good and a high proportion are 'A' grade (these farmers tend to be more experienced at growing and curing vanilla resulting in a high vanillin content – a measure of quality). There are **three categories of traders/exporters** – cross border traders, medium exporters and a large exporter (Figure 1).

Main channels and flows

Vanilla is marketed via a dual-channel system (Figure 1) with 33% exported by the **international export channel**, where 'A' grade beans are sold directly to buyers and processors, and 67% being sold via **cross-border trade in West Papua** where generally lower-quality beans are sold for processing in Indonesia, with some of PNG's vanilla subsumed into Indonesia's vanilla exports. Initial trade is conducted by **cross-border traders** who buy beans from farmers at Maprik or from villages. The beans are carried by the traders, using public motor vehicles (PMV), from Maprik to the provincial capital Wewak, then taken as accompanied airfreight to Vanimo, and then to the Wutung border crossing point by shared taxi. Around 20% of produce purchased from farmers is sold to the large exporting firm which operates buying points in Maprik town. Several **medium-scale exporters** and **one large-scale exporting company** with a dominant exporting role, all nationally owned, undertake formal exports to vanilla buyers in Europe, North America, Australasia and Asia (Figure 2).

Access to markets

The fluctuating international price of vanilla is crucial for the viability of the activities in the VC. The sector went through a very rapid development stage in the late 1990s (growers benefitted from prices of over US$ 220), a bust and a rebirth in the space of 10 years. As a result of the global price crash in 2004 PNG production was virtually abandoned between 2005 and 2015. The increase of prices at the international level in the latest years revitalised the VC providing opportunities of additional incomes. The highest price in 2018 was paid by Switzerland at US$ 500/t (CIF value) and the lowest by Indonesia at US$ 75/t.

The international market requires high quality, traceability and adherence to food safety standards; vanilla exports to the EU are governed by the General Food Law. The large exporting company, which exports 98% of PNG's vanilla to international markets, ensures its produce meets these standards.

Governance and enabling environment

The stated objective of the dominant exporter is to increase output and improve produce quality, particularly through organic certification, to obtain higher and more stable prices. The presence of several smaller, intermittant exporters helps keep up the price paid to producers. A few active farmer cooperatives, which occasionally bulk their vanilla for sale to the main exporter or directly overseas, can also raise the price received. For the, mainly, lower quality grades the price is set by Indonesian buyers in the cross-border market. This increases prices for lower quality produce but also means that PNG loses out in terms of formal export revenue and a proportion of the 10% export tax and may discourage producers from adopting better agricultural and postharvest practices which would increase the proportion of 'A' grade vanilla. The main government organisation charged with facilitating the VC lacks capacity to effectively support growers and ensure all interests are represented.

Figure 2 : Key vanilla producing provinces and export routes

Key: Red arrows indicate the direction of flow of vanilla from the main production areas, indicated by a red circle/star, to the country's exit points – Port Moresby for airfreight, Lae for sea freight and Vanimo for cross-border trade. The thicker red line to Lae indicates that most of the country's vanilla is sent to Lae for conditioning and packaging by the large exporter and then airfreighted to Port Moresby for onward carriage to international destinations.

Economic analysis

Financial profitability of the actors

For the main actors, involvement in the vanilla VC is profitable at 2018 vanilla prices. All three producer scales are highly financially viable at 2018 prices, with net profit rates of 91 to 96%. For the three categories of traders, trading is profitable although margins are much tighter, with net profit rates ranging from 3 to 14%. Net profits in 2018 were estimated at: small-scale vine owner €2,146; medium-scale vine owner €1,967; large-scale vine owner €3,560; cross-border trader €34,336; medium exporter €53,769; large exporting company €5,631,365. This compares favourably with the minimum annual wage of €1,897. However, shall global prices fall or shall cross border trade of low-grade vanilla to Indonesia stop, margins will tighten and some producers and the cross-border and medium-exporters could leave the value chain. Sensitivity analysis indicates that production is still profitable for large scale traders and producers if the international selling price for A grade vanilla fell by 50%, to around US$ 200/kg, but not at US$ 100/kg.

Value added and income distribution

The total (direct actors and suppliers) value added in the VC in 2018 is €67 million. The three main parts of the value added are the net profit of the farmers (75%), the taxes (12%) and the net profit of traders (12% of which 10% for the large exporter) (Figure 3). The total net operating profit of the value chain is estimated at €58 million.

Macroeconomic perspective

Vanilla provides a minor contribution (1%) to the agricultural GDP but the VC makes a net contribution to the balance of trade of €72 million (difference between vanilla exports and inputs imports). The VC contribution to **public funds is positive**, estimated at €1,3 million. Taxes are collected in the VC at the level of formal traders and exporters; no subsidies are provided by the Government. The **rate of integration** of the VC within the national economy (total VA/value of production) **is 96%** meaning that imports of inputs are only 4% of the value of production. However, effects within the other sectors of the national economy are also small because the activities only use low volume of goods and services. **The VC is viable within the global economy**, the Domestic Resource Cost ratio is 0.43 meaning that the domestic factors involved in the VC (labour, land…) amount only to 43% of the economic value generated by the VC calculated at international prices. At the 2018 international prices, the VC is very competitive.

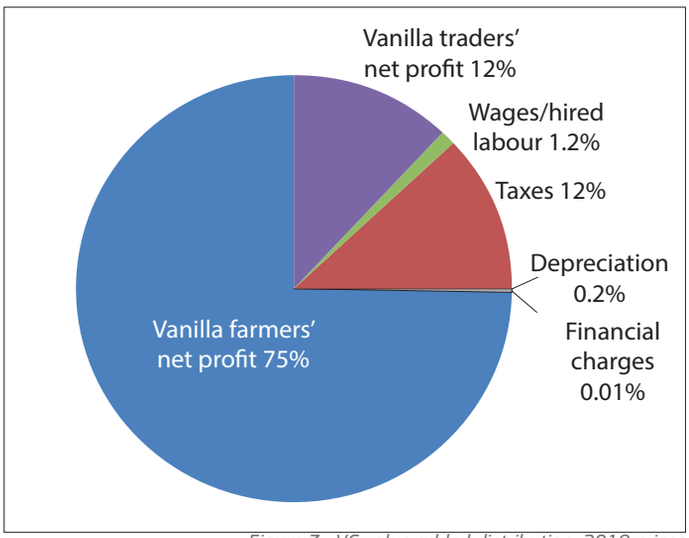

Figure 3 : VC value added distribution, 2018 prices

Vanilla street market, Maprik where cured vanilla beans are traded

WHAT IS THE CONTRIBUTION OF THE VALUE CHAIN TO ECONOMIC GROWTH?

The VC is highly dependent on exports either to Indonesia or internationally. This makes the value chain vulnerable to the international prices - that are determined by the production levels of Madagascar. With the very high international prices of 2018, vanilla appears highly profitable for smallholders as the main amount of labour is provided by family members. The VC's contribution to national GDP, balance of trade and public finances is extremely low; PNG's economy is based on exports of minerals, oil and gas and large quantities of low-value agricultural commodities. However, vanilla is very important to the economy of East Sepik providing income-earning opportunities, contributing to business development and crucial tax revenue.

IS THIS ECONOMIC GROWTH INCLUSIVE?

At the 2018 vanilla prices, the VC provided an opportunity to benefit significantly thousands of smallholders, including women and youth. Proceeds were invested in more nutritious food, housing, education - including higher education -, for buying vehicles used as public moto vehicles (PMV) and for freight, and in trading. This helps to maintain the benefits over time. There is relatively little direct employment, but the injection of money into the local economy is creating jobs.

Social Analysis

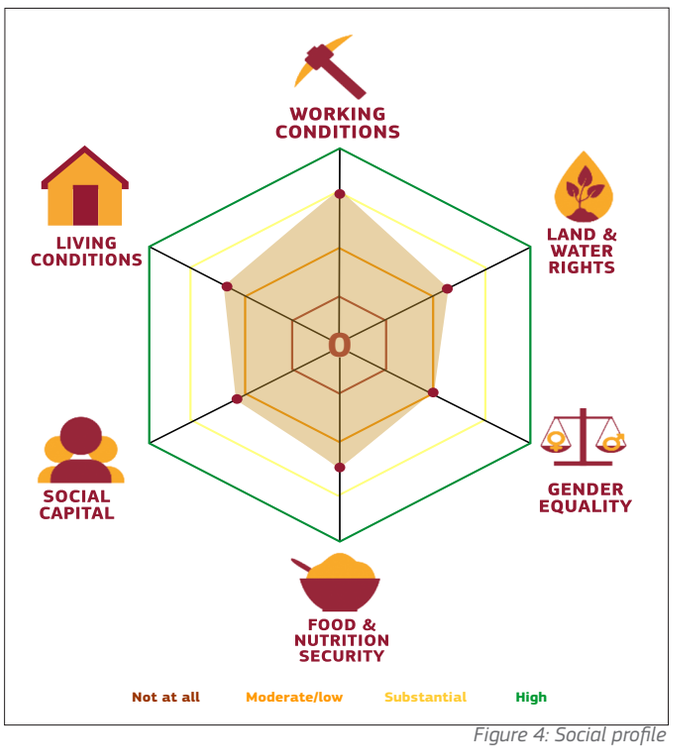

Figure 4: Social profile

IS THIS VC SOCIALLY SUSTAINABLE?

The operations of the value chain contribute to improve the situation of social groups. Vanilla has a major advantage in that men, women and youth with rights to land, in the right agro-ecological zones, can plant very small areas and make a good income. The income in the VC appears to be distributed reasonably despite production being highly labour intensive. Women, youth and children are working in the VC. The extent to which they will benefit from the income will vary with household, but women generally assessed the situation positively. In some cases, women and youth manage their own vanilla gardens and can control the income earned.

Vanilla grower in Turubu showing a bunch of green beans growing on the vine

Working Conditions	• Most vanilla VC activities and benefits are in rural areas, where regulation is not monitored. Children are involved in the VC, particularly contributing to labour-demanding hand pollination before school, at weekends or on holidays. Returns to vanilla production were relatively high at the time of the study, attracting youths to both vanilla production and trading. The most important risk is that of theft and personal injury during travel associated with vanilla trading.
Land and Water Rights	• 97% of land remains under customary title but there is concern at alienation of land held under customary title through granting of Special Agricultural Business Leases. No large-scale acquisition of land for vanilla production was identified; high labour demand for pollination means that even managing 5 hectares of vanilla is a major challenge.
Gender Equality	• Women's participation in the VC (provision of labour, plot management) may not result in equal access to income and benefits. Low entry costs and current high returns make the VC attractive to youth, but proceeds may fuel undue alcohol consumption and lack of access to land may lead to theft of beans from vines.
Food and Nutrition Security	• Vanilla does not compete with food crops, but subsistence food systems do not provide all nutritional needs, particularly proteins. Vanilla contributes to improving rural households' socioeconomic situation when prices are good, as in 2018. Women were knowledgeable about food and nutrition but face significant time constraints.
Social Capital	• Cooperatives face challenges such as poor management, and competition with Investor Owned Firms. Over 400 cooperatives in East Sepik are registered as being involved in vanilla, but few are active. Trust appears to be lowest between farmers and the large exporter. Farmer capacity at individual and organisational level varies considerably. Farmers met were very knowledgeable, and in some cases innovative, with regard to vanilla.
Living Conditions	• The majority of people involved in the VC do not have access to primary health care services. Vanilla proceeds improve ability to access and pay for services. Water and sanitation are a significant issue. The majority of households surveyed reported using vanilla income on education; it is also used to purchase household and solar equipment. Male heads of households reported that changes resulting from engagement in the VC were either completely (35%) or mainly (45%) positive.

Environmental analysis

The vanilla VC system encompasses three phases: (i) production, linked to the three scales of vine-owning, (ii) curing and (iii) packaging and transport, connected to the international export channel and to cross-border trade in West Papua.

Impacts on resources depletion

Potential impacts on resource depletion come from **fossil fuel consumption**, mainly from **transport**, as the vanilla VC is a low input system (no fertilisation, irrigation or chemical pesticides). Fuel consumption represents respectively 71% and 11% of the contribution to resource depletion in the **formal export channel** and in the cross-border trading.

Impacts on ecosystems quality

The main potential cause of ecosystem degradation is **land use** related to vanilla cultivation. The **large and medium vine owning households** contribute by 90% to the vanilla VC impact on ecosystems, while the small vine owing households contribute only by 7%. **Potential losses** derive mainly from land occupation, due to a reduced richness in species in vanilla plots and nearly 30% from natural forest conversion, causing habitat loss and habitat fragmentation.

Impacts on human health

Potential impacts on human health result mainly from **global warming** linked to **land use change** from forest to vanilla plantation. This impact is due to the release of carbon stored in the natural forest areas that were transformed into vanilla plots, resulting in a lower total carbon stock per hectare. **Large and medium vine owning households** contribute over 85% of the vanilla VC impacts on human health, while the small vine owning households contribute less than 7%.

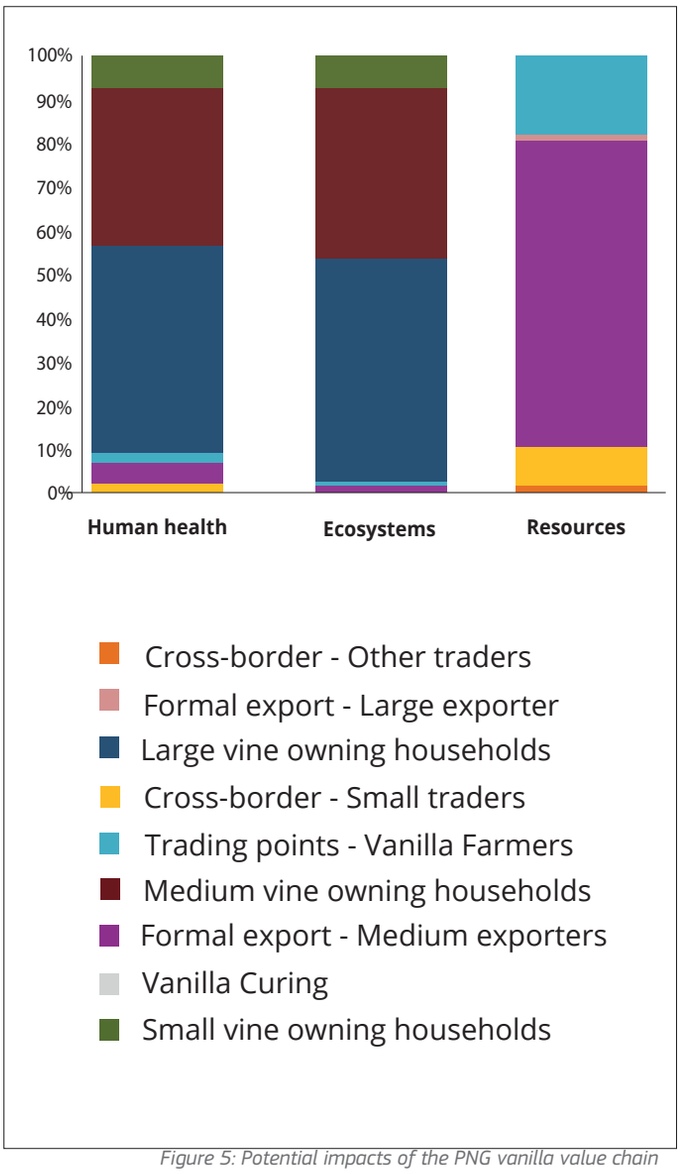

Figure 5: Potential impacts of the PNG vanilla value chain

IS THE VC ENVIRONMENTALLY SUSTAINABLE?

Environmental impacts of the VC are relative because of the current small size of the VC. To improve its sustainability in case of a scale-up in production, there are three main factors to look at: land use change, average yields, and transport. Land use change is a major cause of potential high environmental impact of the VC, as a large expansion of vanilla into natural forest areas will most likely cause deforestation. The average yield is very low, and this directly affects land use as more land is required to produce the same amount of vanilla per hectare compared to other regions with higher productivity.

From a farming perspective, small vine owing households are by far the most eco-efficient of the three scales of producers because, due to their relative higher yields, they require fewer vines, and thus less land to produce the same quantity of cured vanilla beans; consequently, the small producers' contribution to potential impacts on ecosystem quality and on human health is the lowest of the three categories of vine owing households.

Transport has a high environmental impact due to the large distances, complex topography and widespread use of four-wheel drive vehicles by traders and medium exporters. Despite being practiced solely for safety and cost-saving reasons, car sharing to the border with West Papua is important in reducing the environmental impacts of vanilla transport.

Conclusions

Investing in vanilla seems to be very risky as the VC in PNG is highly dependent to international prices that are determined by one single supplying country. As such, vanilla is considered as an opportunity crop for actors that involved when the prices are high.

There has been a considerable price increase in the last five years, as high as US$ 500 per kilogram in PNG. However, industry observers are suggesting that the global price could settle around US$ 100 per kilogram in the next three to four years. This could have a profound impact on vanilla production in PNG.

Risks	Probability	Severity
Price trends: Increase in global prices since 2015 but peak prices considered to have been reached and likely to decline in next 2-3 years.	High	High
Price volatility: Most volatile of all agricultural products.	Very high	Very high
Logistics and infrastructure: Poor roads increase the risk of traders facing higher procurement costs; farmers and traders exposed to risk of theft in holdups partly, due to poor road conditions.	Low	Low
Policies: No specific vanilla policy, limited recognition of challenges and ways to address them along the VC are factors that increase the risk of an unsupportive policy environment.	Medium	Medium when prices are low
Governance and institutions: No public sector organisation with responsibility for vanilla development. One company has positioned as lead agency but not transparent about its operations. Lack of appropriate governance increases risk of vanilla not being viable during periods of lower prices.	Medium	Medium
Social relations: Lack of trust in the vanilla VC, particularly between certain farmers and large exporter; farmer organisations generally not functioning well. Increases risk of vanilla not being viable during periods of lower prices.	Medium	High when prices low
Gender and youth: Risk is that women's participation in the vanilla VC increases their workload, but does not result in equal access to income and benefits.	Medium	High
Weather and climate change: Risk of increase of average air temperature and in annual and seasonal mean rainfall. Intensity and frequency of extreme rainfall expected to increase. Possible risk in shift of vanilla-growing areas; humid conditions will favour spread of diseases; vanilla sun-curing process might be affected; variable localized mud and/or landslides in vanilla gardens planted in steep slopes; inundations in flat areas; soil erosion.	Very high	Medium To high
Natural environment: Land use change; risk of conversion of forest (primary/secondary) areas into vanilla gardens.	Very high	Medium (compared to other cash crops)

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Agrinatura (http://agrinatura-eu.eu) is the European Alliance of Universities and Research Centers involved in agricultural research and capacity building for development.
The information and knowledge produced through the value chain studies are intended to support **the Delegations of the European Union** and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions. VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d-

This document is based on the report "Vanilla Value Chain Analysis in Papua New Guinea" 2020, by Claire Coote (NRI), Richard Lamboll (NRI), Helena Farrall (ISA) and Veronica Bue (Papua New Guinea University of Technology). Only the original report binds the authors.