European Commission

VCA4D
VALUE CHAIN ANALYSIS FOR DEVELOPMENT

N° 22
MARCH 2020

Pineapple value chain analysis in Benin

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 Government of Benin is investing in the transformation of its agricultural sector, following a strategy that combines the territorial and value chain approaches, in homogeneous areas or "Poles of Agricultural Development" to value its local potential. In this context, particular attention has been paid to the development of value chains (VCs) with high value-added potential, including pineapple. A sustainable improvement of production, productivity and competitiveness of pineapple has been promoted since 2016 through the 'Programme National de Développement de la Filière Ananas' (PNDFA). In Benin, pineapple is one of the main crops with export potential after cotton and cashew. The production areas of pineapple are mainly located in the southern and central regions of the country. 83% of the national production is concentrated around the Allada Plateau in the Atlantic Department. New areas of production are also emerging progressively.

The European Union Intervention

The European Union (EU) in Benin aligns itself with the national strategy to support the agricultural sector through the 'Projet d'Appui au Développement du Secteur Privé' (PADSP) financed by the EU and the Agence Française de Développement (AFD). In the framework of the PADSP, support for the pineapple sector is provided by the 'Projet d'Appui au Renforcement des Acteurs du Secteur Privé' (PARASEP). This technical assistance contributes both to strengthening a conducive environment for VCs development, and to promoting efficient business models which generate sustainable and inclusive value added for the actors involved. The EU is also supporting other initiatives concerning the pineapple sector through the "Fit for Market" project led by the Europe-Africa-Caribbean-Pacific Liaison Committee (COLEACP). The Belgian Cooperation Agency, ENABEL, is also active in this VC via the programme 'Développement de la Filière Ananas' (DEFIA) with a budget of €25 million.

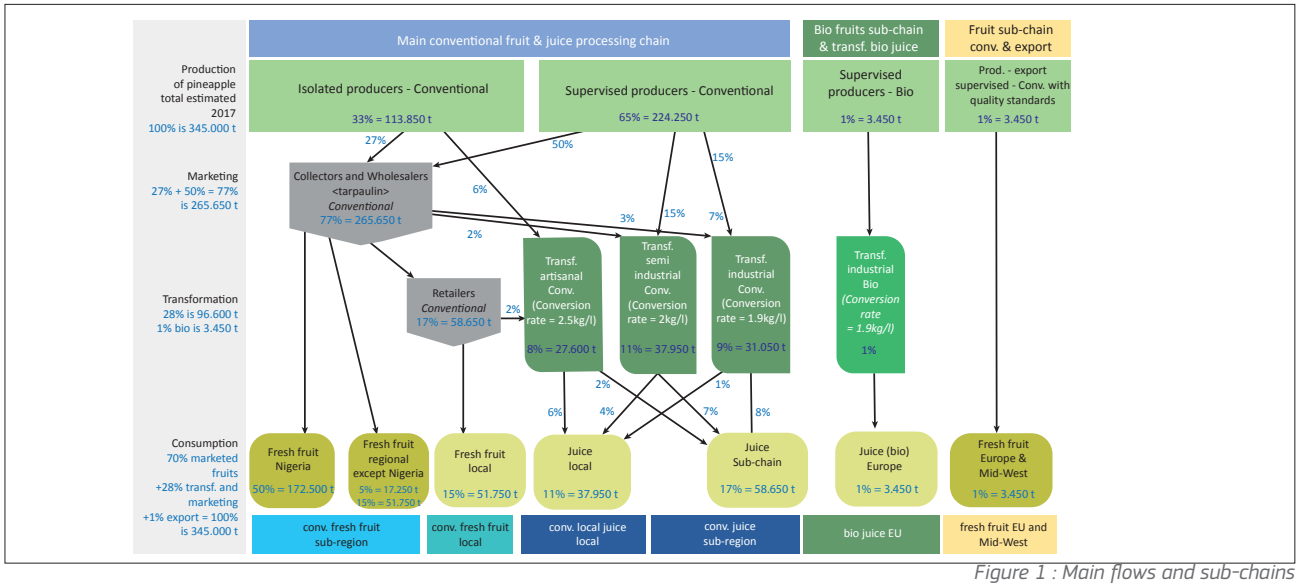

Figure 1 : Main flows and sub-chains

Functional analysis

Varieties used

The two main varieties produced in Benin are the **Sugar Loaf** (around 75% of the production) and the **Smooth Cayenne** (25%). The Sugar Loaf variety is acclaimed for the ease of management throughout its cycle including the production of suckers. On the other hand, the use of the Smooth Cayenne variety is in decline due to the cost of suckers but mostly to the erosion of genetic potential which makes it susceptible to dieback.

Pineapple production

The production of pineapple in Benin increased from 51,000 t in 2000 to 316,000 t in 2014, or a six-fold increase in fifteen years. This trend is irregular, but the production has exceeded 300,000 t since 2016 and is estimated at **345,000 t for 2017**.

Producers differ according to their agricultural practices (conventional, organic) and the level of supervision (Figure 2). Supervision through membership to a group or association offers opportunities to access to services and various markets. Agricultural practices and yield are connected to supervision by many parameters: level of technical skill (linked to access to agricultural advice and experience), access to inputs (linked to financial capacity), access to high quality suckers.

Pineapple juice proccessing

There are three types of juice processors. **Artisanal processors** (8% of total production of fresh pineapple) represent the largest group but their processing capacity is low. They buy pineapple directly from isolated producers and retailers. The capacity of **semi-industrial processors** (11% of total production of fresh pineapple) is higher than that of artisanal processors, but due to the constraints they face they cannot produce at full capacity throughout the year. They work through informal contracts with producers. **Industrial processors** (9% of total production of fresh pineapple) operate below capacity (40% of the established capacity) due to the lack of raw material. They have contractual relationships with supervised producers for the supply of the majority of their fruit. Pineapple drying in Benin remains marginal compared to juice processing.

Gouvernance

The pineapple VC in Benin functions **without formal contractual relationships between the actors**. This situation prevents the VC from valuing its production and marketing potential of primary and processed products.

A large number of producers are represented by the Fédération Nationale des Coopératives de Producteurs d'Ananas du Bénin (FENOCOPAB) at national level. There are also some other associations and groups at local level.

Since 2016, the Association Interprofessionnelle de l'Ananas du Bénin (AIAB) constitutes a multi-stakeholder exchange platform that gathers the actors of the VC - producers, processors, input suppliers, research institutes and the financial sector. It aims to improve the coordination between actors in order to increase the production, quality and marketing of fresh fruits and derived products at regional and international markets.

	Supervised conventional producers	Isolated (non-supervised) conventional producers	Supervised organic producers	Conventional exporting producers
Share in national production (%)	65	33	1	1
Yield (t/ha)	50	25 - 35	50	60
Average area (ha/producer)	1.5	0.5	1.5	>10
Farm gate price of fresh pine-apple in 2018 (CFAF/t)	45.000 – 60.000	45.000 – 60.000	95.000	80.000

Figure 2 : Types of pineapple producers

Economic analysis

Viability of the activities

The activities of the VC are viable for all actors. The annual incomes of the exporting producers and organic producers are the highest. The income of the isolated conventional producers and the supervised conventional producers are less than €500 and more than €2,000, respectively.

The more industrialised the processing, the higher the volumes of processed pineapples and therefore annual incomes. The income of a typical artisanal processor is lower and more vulnerable compared to that of a semi-industrial processor. Processors have problems regarding the regularity of supply of fresh fruit and incur significant costs.

The incomes of traders (mainly women) depend on the size of their business as well as their position in the VC. The annual income of a retailer from pineapple is just over €500. Wholesalers and exporters have a strong negotiating position as they hold information on markets and control prices.

Contribution to the national economy

The total value added of the VC is about CFAF 20 billion (€30 million). Conventional sub-chains (Figure 1) create 72% of the direct value added (DVA). However, with the use of only 2% of total fresh pineapple production, the organic and export sub-chains create 28% of the DVA. Producers create 51% of the DVA.

The VC is highly dependent on imports for the agricultural production of fresh fruit but mainly for its transformation into juice (need of different types of packaging). These imports represent a loss of value added for the national economy as on the one hand, they are expensive and therefore reduce the income of the VC actors, and on the other hand, these consumables could generate indirect value added if they were produced in the country.

The VC represents 0.42% of the GDP and 1.95% of the agricultural GDP. These rates were higher in the past, as the VC today still suffers the consequences of the ethephon crisis (ban on the export of pineapple to Europe due to the presence of pesticide residues) it faced some years ago.

The trade balance of the VC is negative by €4.17 million due to the imports of inputs being higher than the exports of pineapple. As for the **contribution to public finances**, the actors do not receive subsidies and the taxes collected are insignificant as the activities are mainly informal.

Viability within the international economy

The Nominal Protection Coefficient (NPC) is 0.9. This means that VC actors receive slightly less income than they would receive in the international market. The Domestic Resource Cost Ratio (DRC) is 0.5, showing that **the VC has a comparative advantage**, as the economic value generated by the VC calculated at international prices is greater than the value of domestic factors of production.

Jobs and wages

It is estimated that around **13,000 producers are growing pineapple and more than 100,000 people are active in the VC**. Producers receive the largest share of the DVA (43%). 14% of the DVA goes to processors and a significant part (22%) to workers (Figure 3).

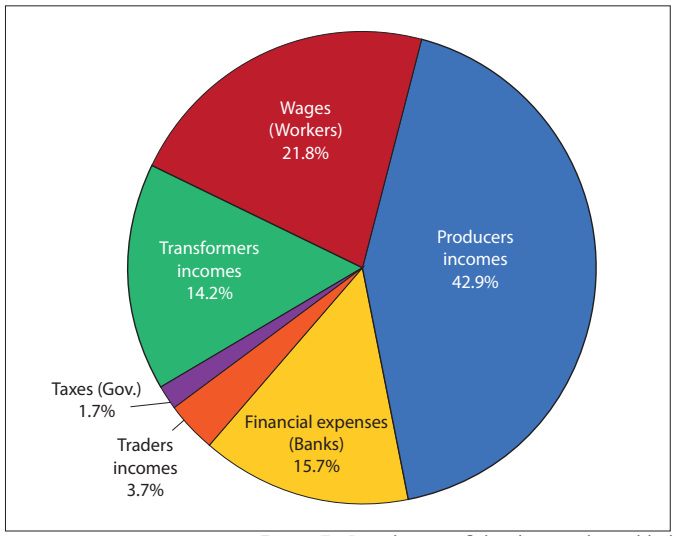

Figure 3 : Distribution of the direct value added

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

The contribution of the VC to the agricultural GDP (<2%) is currently quite low. The sub-chains least integrated into the national economy (around 55%) are those which include processing that requires imported intermediate consumptions. It might be worth offering domestic substitutes for these imports (mainly packaging) which can be very expensive and represent a loss for the national economy.

Social analysis

The following graph and table provide a picture of the main social consequences of the VC activities in 6 strategic domains.

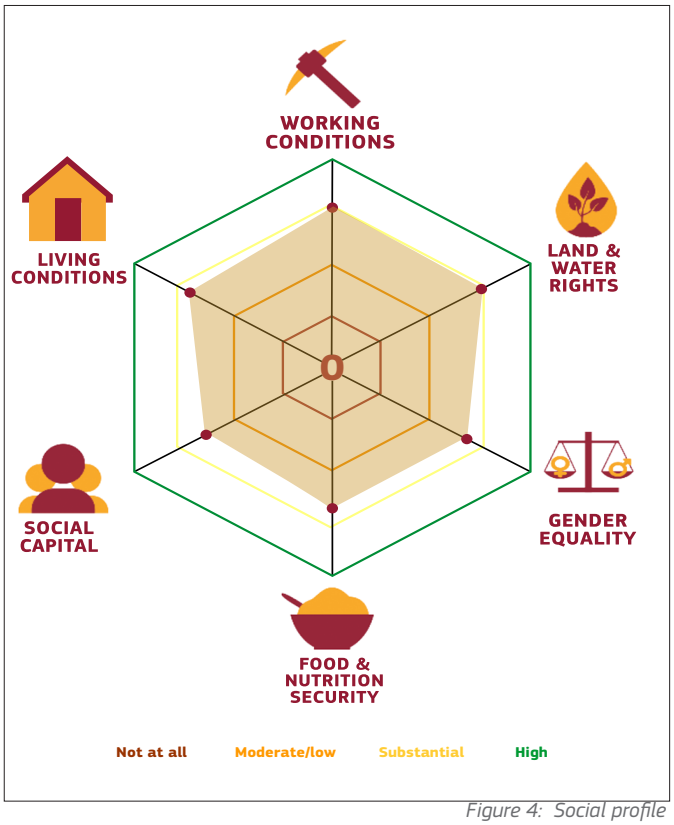

Figure 4: Social profile

Working conditions	• Most employment contracts are verbal and based on trust. • Child labour is not widespread, however, there are a few cases of children of 10-14 years old involved in the marketing of pipeapple. • The pineapple VC is attractive to investors (business relationships, innovations). It is motivating existing actors and encouraging new entrants.
Land and water rights	• Benin ratified the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT) in 2013. • The introduction of a new code and a new management framework which involve communities and civil society for land management prevents land grabbing by foreign companies that was gaining momentum. • In the Atlantic Department, the proportion of land inherited by men and women is 88% and 12%, respectively.
Gender equality	• Women are involved in production by 10%, in processing by 40% and in marketing by 80%. • In the Atlantic Department, and specifically in the pineapple VC, gender-based discrimination is low as a significant proportion of women participate in VC management at all levels with high leadership.
Food and Nutrition Security	• The actors of the pineapple VC in the Atlantic Department benefit from a high level of food availability and accessibility (thanks to widespread practice of agriculture, proximity to Cotonou where the food surplus goes, wide choice of food).
Social capital	• The VC is organised and structured by professional groups at each stage. Organic and conventional pineapple producers, from the bottom up to the national level, are organized within FENACOPAB, processors within FENACOTAB, traders within CCAB and exporters within ANEAB. These professional groups created the interprofessional association on pineapple (AIAB) in 2016. • Producers receive information on agricultural practices, prices and agricultural policies through professional organizations and the AIAB. However, around 60% of producers (men, women and young people) are not belonging to any professional organizations.
Living conditions	• The living conditions of the VC actors are gradually improving (better access to health services and education, improved quality of housing), particularly in the Atlantic Department; and the level of education for children is increasing. • Vocational training specific to the VC provided by investors with the support of the AIAB is very recent.

IS THIS ECONOMIC GROWTH INCLUSIVE?

Producers in conventional sub-chains are the most numerous and suffer from a significant difference in farm gate prices and individual income compared to producers in other sub-chains. Isolated producers, participating informally in the value chain, are more likely to have lower yields and have to sell pineapple at lower prices to access markets. Young people are more likely to take part as isolated producers because they are cautiously approaching pineapple farming, starting first with small production areas. As a result, the economic growth generated by the value chain is less inclusive for some categories of actors. However, at the production level, women are increasingly involved, and are the main actors in marketing.

IS THE VALUE CHAIN SOCIALLY SUSTAINABLE?

The pineapple value chain in Benin contributes to a sustainable development from a social point of view (female integration in the value chain, improvement of living conditions, access to food...). However, this sustainability can be improved if an attention is given to the main constraints in the following domains: access to productive resources and credit, availability of labour at farm level, financing of processing and packaging equipment for pineapple juice and logistics conditions for the export of the fruit.

Environmental analysis

The environmental analysis studied all the identified **7 sub-chains** (Figure 1). The quantification of potential environmental impacts was measured for activities that took place within the country's border. Since there are 2 products in the VC (fresh pineapple and juice), the damages have been measured in 1 kg of equivalent pineapple. The results are to be read by 1 kg of product and not by the volume of production of each sub-chain.

Damages to the areas of protection

The agricultural production stage is the major contributor to the damage caused by the VC. More specifically: damage to human health is mainly due to **emissions from fertilizer application**, damage to ecosystems is mainly due to **land use** and, damage to resources is mainly due to the **manufacturing of fertilizers** (Figure 5).

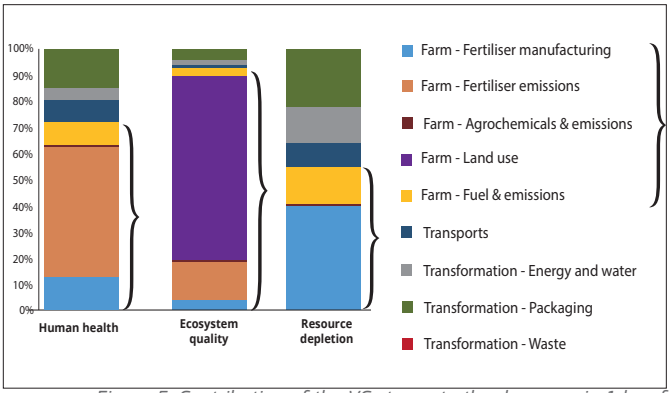

Figure 5: Contribution of the VC stages to the damages in 1 kg of equivalent pineapple

Comparison of sub-chains

For fresh fruit sub-chains, 1 kg of fresh pineapple exported to the EU contributes the most damage to human health mainly due to the carton for packaging. 1 kg of pineapple exported to the sub-region contributes the most damage to ecosystems and resources due to the fuel used in road transport. Fresh pineapple consumed on the local market in Benin has the lowest contribution to the three areas of protection.

For the pineapple juice sub-chains, organic juice exported to the EU contributes the least (per kg of pineapple processed) to damage to human health and ecosystems due to lower emissions in the fields (linked to the application of 'fertilizers) for organic producers. However, this sub-chain contributes the most damage to resources mainly due to the use of diesel in transport and plastic bags in packaging. The environmental performance of the juice sub-chain is linked to the origin of the pineapple used by processors, the rate of conversion from fruit to juice, the energy and packaging.

Damages caused by the export sub-chains increase significantly when the impact of the transport beyond Benin's borders is considered (particularly for the fresh fruit exported to the EU by plane).

Comparison of organic and conventional production

Organic pineapple production has significantly less impact than conventional production per cultivated hectare. In kg of pineapple (Figure 6), this advantage is less significant, but it creates still less impact as the yield of organic production does not vary too much from that of conventional production. Damages are higher for conventional pineapple due to the use of nitrogen fertilizer (manufacturing of urea and emissions linked to the urea application).

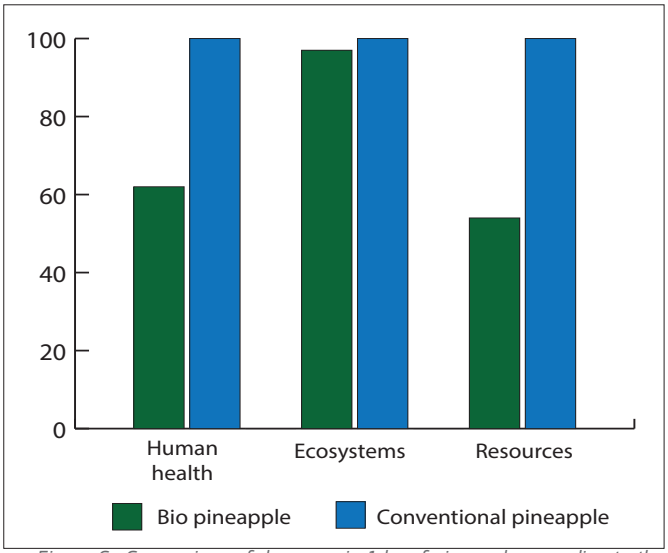

Figure 6 : Comparison of damages in 1 kg of pineapple according to the production systems

IS THE VALUE CHAIN ENVIRONMENTALLY SUSTAINABLE?

The agricultural production stage is the major contributor to the impact caused by the value chain on human health, ecosystems and resources. The damages are mainly related to the land use, manufacturing of fertilizers and emissions linked to their application in the field.

Organic agricultural production has significantly fewer potential impacts than the conventional one. However, the difference between isolated and supervised producers in terms of environmental impact is not significant.

Improving yields through a proper fertilization management, developing organic production and reducing losses, are ways to enhance the sustainability of the value chain.

Conclusions

Main constraints

The following main constraints can penalise the pineapple VC:

- Deficit in electrical energy, limiting the development of industrial activities and the attraction of national and international investors;
- Strong dependence on imports of intermediate consumption goods in the VC;
- Lack of transport infrastructure (road / rail, port, airport);
- Lack of skilled labour in production and processing activities;
- Weak incentive of the business environment linked to the low efficiency of administrative and economic governance leaving the country in a disadvantageous position compared to its competitors.

Recommendations

- The most vulnerable stage in the VC is the pineapple production. Gaps in yields are generally linked to the availability of labour, agricultural equipment and inputs. Providing producers with more appropriate agricultural and technical advice would increase yields without increasing the amount of inputs used. In Benin, the yield of organic production is close to that of conventional production, they only differ in the use of chemical fertilizer. From both economic and environmental point of view, organic pineapple production is relevant.
- The development of well-functioning producers' groups and cooperatives is favourable to the VC. The interprofessional association should also focus on the development of vertical coordination. This would make it possible to fill various gaps that have an impact on the supply and quality of the fruits (labour, suitable inputs, formal contracts, technical expertise, etc.).
- Access to funding is a drag on the development of activities in the VC. Only industrial processors and some big producers obtain credits. Moreover, the granting conditions of these credits are unfavourable to borrowers.
- A small part of the production of fresh pineapple is processed in the country. Encouraging the production of fresh pineapple should be done in parallel with the development of processing capacities in the secondary sector which potentially adds economic value to the agricultural raw material.
- Imports of the goods and services necessary for the VC are expensive. The development of agricultural clusters within the sub-chains and national production units for these consumables (containers, labels, etc.) and equipment should be encouraged to limit imports.
- The Atlantic Department is currently the most populated area and is reaching saturation. Potential areas for pineapple cultivation have already been identified but there is a need to reflect on incentive mechanisms for encouraging people to cultivate pineapple in these areas.
- Some potential solutions are to be considered to limit the environmental impact: (i) increasing yields without increasing the quantity of input, via optimised management of fertilization (reduction of the quantities of nitrogen fertilizer and the fractionation of specific intakes at the level of plant development stage), optimisation of the flower induction treatment, better timing of manual weeding, and elimination of parasitic infestation outbreaks; (ii) producing organic pineapple, which brings similar yields as conventional; (iii) reducing losses along the VC through a better flow of sales and improved transport logistics.

Value Chain Analysis for Development (VCA4D) is a tool funded by the European Commission / DEVCO and is implemented in partnership with Agrinatura.

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 "Pineapple Value Chain Analysis in Benin" 2020, by Doriane Desclee, Christophe Kinha, Sandra Payen (CIRAD), David Sohinto, Jean-Claude Govindin (CIRAD) and Freddy Padonou. Only the original report binds the authors.