# ANNALES DES SCIENCES AGRONOMIQUES

http://www.ajol.info

Volume 25 - Numéro 2, 2022

Publié en décembre 2022

**ANNALES DES SCIENCES AGRONOMIQUES**

Revue publiée par la Faculté des Sciences Agronomiques (FSA) de l'Université d'Abomey-Calavi (UAC)



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Les frais de publication sont fixés à 50.000 F CFA (77 €) par article accepté.

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**Dépôt légal** : N° 1418 du 19/10/98 Bibliothèque Nationale du Bénin, Porto-Novo, Bénin.

ISSN : 1659-5009

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Publié en décembre 2022

*Annales des sciences agronomiques, Vol. 25-2 : 223-242, 2022 ISSN 1659 - 5009*

# ECONOMIC ANALYSIS OF THE PINEAPPLE VALUE CHAINS AND THE SHARING OF WEALTH CREATED IN BENIN

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**ABSTRACT**

The value chain and the sector are two concepts that describe the production processes, transformation and distribution of products. While the second emphasizes the stages undergone by a product from its production to the final consumer, the first focuses on the added values created at each stage. This article aims to identify the pineapple value chains and measure their effectiveness through the sharing of wealth created. To do this, a survey is carried out among 365 pineapple producers, 110 traders and 45 processors. The analysis method was to map these value chains and examine the weight of the added values created by each actor in relation to the overall added value of the chain. It is ineffective since the distribution of the wealth created is uneven and true depending on the actors and the chains. Producers are the weak links in these chains and they should be organized so that they can better take advantage of this jewel.

***Key words*** : value chains; effectiveness; added values; pineapple; profit; wealth sharing.

# ANALYSE ÉCONOMIQUE DES CHAINES DE VALEURS DE L'ANANAS ET DU PARTAGE DES RICHESSES CRÉÉES AU BÉNIN

**RÉSUMÉ**

La chaîne de valeurs et la filière sont deux notions qui décrivent les processus de production, de transformation et de distribution des produits. Alors que la seconde met l'accent sur les étapes subies par un produit depuis sa production jusqu'au consommateur final, la première s'appesantit sur les valeurs ajoutées créées à chaque étape. Cet article a pour objectif d'identifier les chaînes de valeurs de l'ananas et de mesurer leur efficacité à travers le partage de richesses créées. Pour ce faire, une enquête est réalisée auprès de 365 producteurs d'ananas, 110 commerçants et 45 transformateurs. La méthodologie utilisée a été de cartographier ces chaînes de valeurs et d'examiner le poids des valeurs ajoutées créés par chaque catégorie d'acteurs par rapport à la valeur ajoutée globale de la chaîne. Il ressort de cette étude que l'ananas dispose de sept chaînes de valeurs locales et extérieures. Les différentes chaînes ne sont pas efficaces puisque la répartition des richesses créées est inégale et varie suivant les acteurs et les chaînes. Les producteurs constituent les maillons faibles de ces chaînes et il conviendra de les organiser pour qu'ils tirent mieux profit de ce joyau.

***Mots clés*** : chaines de valeurs, efficacité, distribution de l'ananas, partage des richesses.

## INTRODUCTION

The concept of sector is not separated from that of the chain since the classics. From 1960, the use of the term "sector" will spread as an extension of the tools of national accounting, mobilized in the formulation of post-war industrial policies (Morvan, 1985). The sector is an alternative and complementary economic category to the concept of branch or sector proposing a division of the productive system to better understand the dynamics of emergence, decline and reconfiguration of its components (Bidet-Mayer & Toubal, 2013 ; Duteurtre *et al.,* 2000). This division is based on the identification of relationships between certain economic agents, from the technical point of view (input-output relationship), organizational (integration, specialization) and forms of

exchange (competition, monopoly). For Cheriet (2015), the analysis of the agrifood chains which developed initially on the bases of characterization of flows, quickly knew a succession of theoretical and methodological contributions which currently make it an empirical framework allowing the identification of vertical relationships, value-sharing mechanisms, price transmission tools and the profile characterization of the actors involved and their roles in the structuring of production and exchange activities. The sector study is a very precise analysis of a whole system generated by a product (Terpend, 1997 ; Lebally, 2006). It is exhaustive of all those involved, their environment, the actions that are carried out and the mechanisms that led to such actions.

For Fabre (1994), the term "product chain" means all the economic agents (or fraction of agents) who directly contribute to the production of a goods. The "product chain" traces the succession of operations which, starting from the upstream of a raw material or an intermediate product, ends up downstream, after several stages of transformation to one or more finished products at the consumer level. It allows to better understand the strategies of the actors, the mechanisms of price structuring, to identify and characterize the constraints linked to the trade of a product in order to design the actions to overcome them (Duteurtre *et al.,* 2000). In a sector analysis, we are concerned with the successive stages of the product and not with the actors who therefore do not necessarily know each other and we are more interested in the functions exercised by each of them so that the product is available on time, in the form desired by the consumer (Abbott, 1993).

The first break in this concept resulted in the 1980s in the emergence of the competitive advantage paradigm of Porter (1982) where the focus is now placed on questions of firm positioning, their competitiveness and the integration of "secondary" operations as determinants of the value created by companies (Cheriet, 2015). Born within the company, the value chain concept makes it possible to decompose the activity of the firm into sequences of elementary strategically important operations and to identify the sources of potential competitive advantages (Hines et al., 2004). It allows strategic decisions to be made to position the firm's product or services on the market in terms of cost or quality (Hines and Rich., 1997; Lambert et al., 2007).

The value chain is fundamentally concerned with the values added at each stage of the chain process as a central element in the chain of activities carried out between production and consumption whereas the previous concepts did not examine these as important in the development process. She is concerned with the different stages that the product undergoes by emphasizing the values brought by each actor in the chain (Lambert *et al.,* 2007). As it is difficult to have the final product from the same firm, companies organize themselves in the supply chain and each company brings part of the value to the final product. The concept of global value chain of Gereffi & Korzeniewicz (1994), marked a turning point in the conception of value chain by combining some elements of

its predecessors and by adding the concept of chain governance, namely the way in which the different companies in the chain are coordinated to become more competitive. Finally, under the impetus of the work of Gereffi *et al.* (2005), and through the introduction of a dynamic and multidisciplinary views, a last development allows to highlight the concept of global value chains (CGV) (FAO, 2015). In an agricultural sector, value chains coordinate and overlap to achieve a finished good. An agricultural value chain is made up of the juxtaposition of production, processing and marketing units that act on the same product, from its production to the final consumer. Each company brings value by processing, transporting, storing or cleaning the product (Herr and Muzira, 2012).

The various agricultural productions in Africa are structured in value chains which ignore each other. Indeed, different actors act on these products from their primary production, their transformation into different derivatives and their transport before reaching urban centers. This system has developed in recent decades with the development of urban centers, especially for food products (Timmer *et al.*, 1986). But this structure has long been examined in the form of a sector and few studies are devoted to it in terms of value chains. These sector studies often relate to studies or policies for the marketing of agricultural products (Abbott, 1993 ; Harriss, 1982 ; Timmer *et al*, 1986 ; Lebailly, 1990). However, these analyzes of sector do not place sufficient emphasis on the sequential links which exist between the actors (producers, processors, traders, financiers, transporters) although they describe their functions and the income they get from these functions (Timmer *et al.*, 1986). They well describe product flows but provide less information on the sector governance, the distribution of wealth created, the degree of transparency and information circulation and therefore on the level of efficiency of value chains. It is imperative to conduct efficiency analyzes of these product flows in terms of value chains in order to focus on the interdependencies between these companies, the prioritization of activities, decision centers, power relations and relationships, support activities of various kinds: supply of inputs, financial services, transport, packaging, etc. (Gereffi *et al.*, 2005 ; Champion, 2014). This study is conducted to understand the value chains of agricultural products, especially those of the pineapple. What are the value chains of pineapple and their governance? What is the degree of efficiency of each of these chains?

This article aims to identify the pineapple value chains and to check out the degree of effectiveness of these chains. Thus, after the working methodology, section 2 describes the different pineapple value chains, the third is concerned with the distribution of the values created between the actors within the chains.

## MATERIAL AND METHODS

### *Study area*

Benin's economy is mainly agricultural and the main export crops have been oil palm since the colonial period and cotton since the 1980s. But with the rise of Asian competition, the drastic drop in yields and the rise in production costs (Djègui et al., 1996), the oil palm has lost its importance and is replaced by other crops depending on the regions of the country and especially by the cultivation of pineapples in the Atlantic department. This department, mainly made up of the Alladatray, which occupies more than three-fifths of it (Dissou, 1986) produces more than 98 % of Beninese pineapples (MAEP, 2007). This plateau is limited to the north by the Lama Depression, constituted of black or vertisol soils, to the West by the Lama and Lake Ahémé, to the South by Lake Nokoué and the swamps which serve as a junction between the plateau and the Atlantic Ocean and to the East by the Ouémé river. It covers the municipalities of Allada, Zè, Tori and partially those of Toffo and Abomey-Calavi (Figure 1).

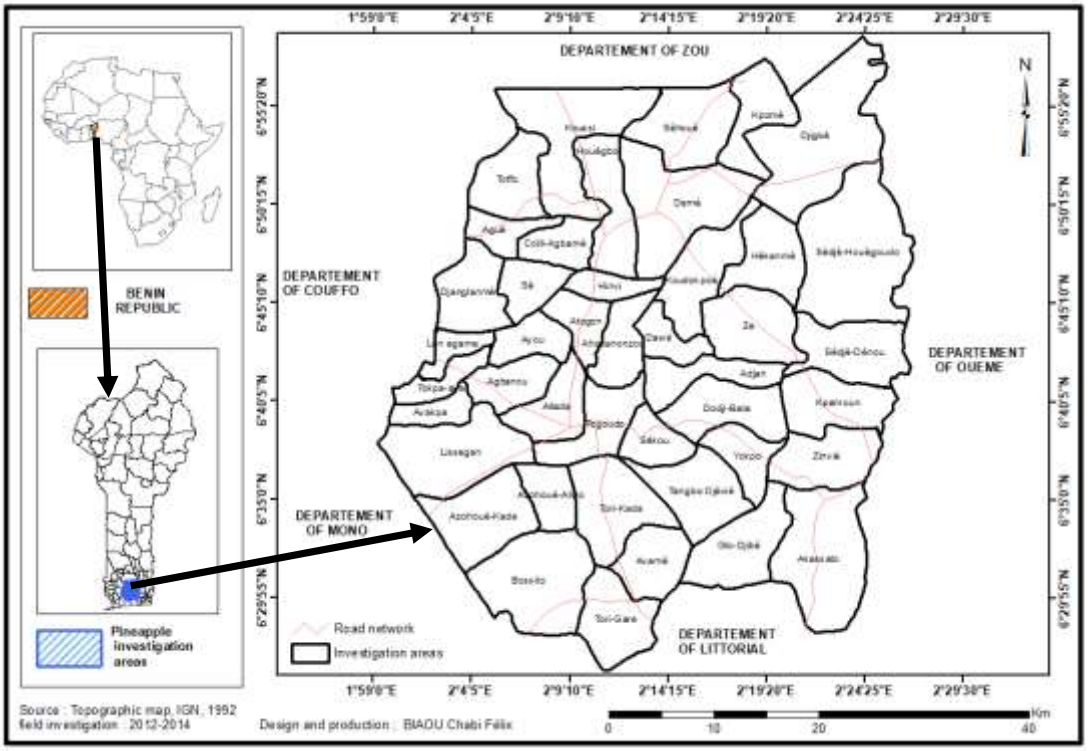



Figure 1. Presentation of the study environment

Source : Survey data, 2014

According to Dissou (1986), the pedogenesis of lower Benin is essentially influenced by the subequatorial character of the climate, the ecological substratum dominated by clay-sandy formations, and the relief where a set of relatively flat plateaus predominates, framed by faults, valleys and alluvial plains often swampy. There are four main soil units: bar soils, tropical ferruginous soils, tropical black clays and hydromorphic soils, the first two of which are more common on the plateaus and are suitable for growing pineapple. The plant landscape of this region, shaped by edaphic, climatic conditions and human action (with its population and importance) (Dissou, 1986) is dominated by the ubiquity of the oil palm. The association of this plant with other plant formations and cultures is both a reflection of the forms of cultural management, a reflection of the relative importance of rainfall, various edaphic conditions and also a reflection of the importance of this culture in satisfying the needs of the populations. In recent decades this landscape has been gradually replaced by pineapple plantation in association or as a relay crop with other crops.

The subequatorial climate of the area, characterized by two rainy seasons alternating with two dry seasons, that allows pineapple producers for planting it every day and the fruit floods southern markets all year round.

*Techniques and data collected*

The data collected from 365 producers randomly chosen mainly focused on the characteristics of households (gender, age, experience in pineapple production, size and composition of the household), the areas planted, the areas harvested and sold, the sale price, the input costs, the tools used, their costs and lifetimes, the units and places of sale, etc. 110 traders were interviewed on the quantities sold per month, the buying and selling units, the commercial expenses (transport, packaging and incidental expenses), loading and unloading, other services provided to the fruit, other products sold, the supply and sales markets, years of experience, level of education, secondary activities, handling, transport costs, sales costs, difficulties encountered. At the level of the processors, 45 of them are randomly selected and the data collected are related to the quantities of pineapple processed per cycle, the places of supply and sale, the duration of the cycle, the number of cycles per month, the equipment used, their acquisition costs and their lifespan and the small equipment used, the quantities of juice produced per cycle, the places of sale and the commercial costs. Vehicles are counted at the crossroads of Savi (Ouidah), Pahou, Godomey interchange, Sèmè crossroads, the Dako hotel in Bohicon in three different periods : in March 2014 ; in November 2014 and in May 2015. This counting made it possible to determine the flow of the product towards the countries of the hinterland, Nigeria and the interior of the country.

Secondary data is collected from institutions such as the Chamber of Agriculture, the Chamber of Commerce and Industry of Benin (CCIB), the INSAE. Discussions are taking place with the customs administration on

export and import practices for agricultural products, especially pineapple and its derivatives, taxes and duties, subsidies and other export charges.

For Europe, the average pineapple price for 2015 is used. These prices are provided by the newspaper FRUITOP. Data on fruits mercurial are not available in the countries of the sub-region, the prices of pineapples are collected by phone exchanges each month with friends and relatives of these capitals. The prices from the ABC / SNV report (2016) which differ very little from those collected by telephone exchange are also used. In addition, at the level of Nigeria, the exchange rate of Naïra fluctuates enormously on the informal money market. The price per kilo of pineapple is determined monthly based on the informal market exchange rate and we used the April 2014 to May 2015 prices from the Lagos market. On the hinterland markets (Niamey and Ouagadougou), the collection period is from June 2014 to May 2015.

*Methods of analysis*

The analysis of the pineapple value chains focused on a systemic model that takes into account the interactions between the actors through technical, organizational and communication innovation. We started from the Performance Management Structure model to analyze the agro-industrial complex and by emphasizing the cost-benefit elements, the added values and the margins that each actor and all the actors earn for each value chain identified.

Value chains have been mapped from field observations and stakeholder responses to locations of supply, sales, buying and selling units. Revenues, business expenses, incidental, by cycle (production or processing) or trip and by period made it possible to establish the operating accounts at the level of each actor.

The analysis of the efficiency of value chains can be carried out by different methods, including the degree of integration of the markets in which the product is traded or the production or processing efficiencies of the product. The first are more related to markets and therefore to marketing and the second to production and processing systems. So these two methods do not simultaneously take into account the different actors in the chain. We used the value-sharing method. From operating accounts, the added values created at the level of each actor are determined. These added values are reduced to the ton per actor and compared with each other.

In relation to the sharing of added values between the actors, for a given chain, the sum of the added values per ton of all the actors in the chain is determined and proportion of the added value created by the actor in the overall added value determined per ton is calculated.

## RESULTS AND DISCUSSIONS

### *Main pineapple value chains*

From the flow mapping made on this speculation, seven value chains have been identified (Biaou *et al.*, 2016). Overall, they can be grouped into five value chains according to the nature of the product and the places of sale : local fresh pineapple chains, discard value chains, outdoor fresh pineapple chains, local juice chains and outdoor juice chains (Figure 1).

Discussions with the actors in these chains, we distinguish three groups of fruits: selected fruits (10 to 15 % of production), rejected fruits (60 to 75 %) and uncontrolled ones directly sold on the markets (15 to 25 %). These fruits are sold, processed or consumed locally or exported. Almost 80 % of the selected fruits exported to European markets represent barely 5 % of national production. This shows that more than 70 % of Beninese pineapple production is exported to Nigeria, about 5.2 % to the hinterland countries and the rest is about 20 to 25 % consumed fresh or processed inside the country.

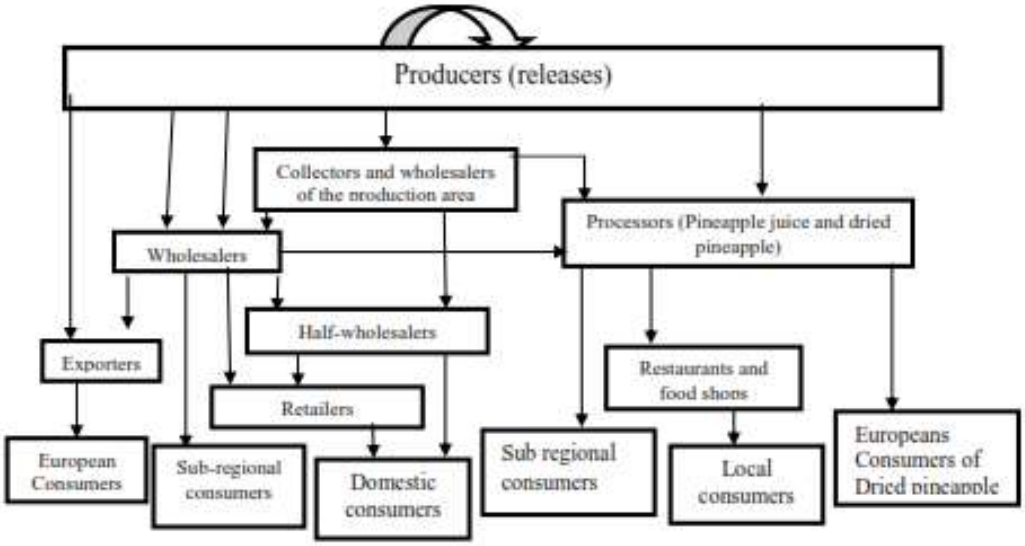



Figure 2. Cartography of Benin pineapple chains

Source : Survey data 2013, 2014.

*The fresh pineapple value chain in the local market*

The value chain of fresh pineapples on the local market is led by several players (Figure 3). The producer delivers his product directly either to collectors or to wholesalers or both. Collectors supply both wholesalers and semi-wholesalers. Wholesalers, on the other hand, serve semi-wholesalers and retailers in the urban centers of Cotonou, Porto-Novo, Sèmè, Bohicon, Dassa, Savè, Parakou, Djougou, Kandi, Malanville, Abomey-Calavi, and their suburbs. These different actors do not have a trade register; they operate in the informal sector. The limits of this chain are linked to police harassment, the sorting without standards carried out by collectors and wholesalers with the producer, the lack and dilapidated nature of transport vehicles and the lack of organization of the producers who make the brokers graft between producers and wholesalers.

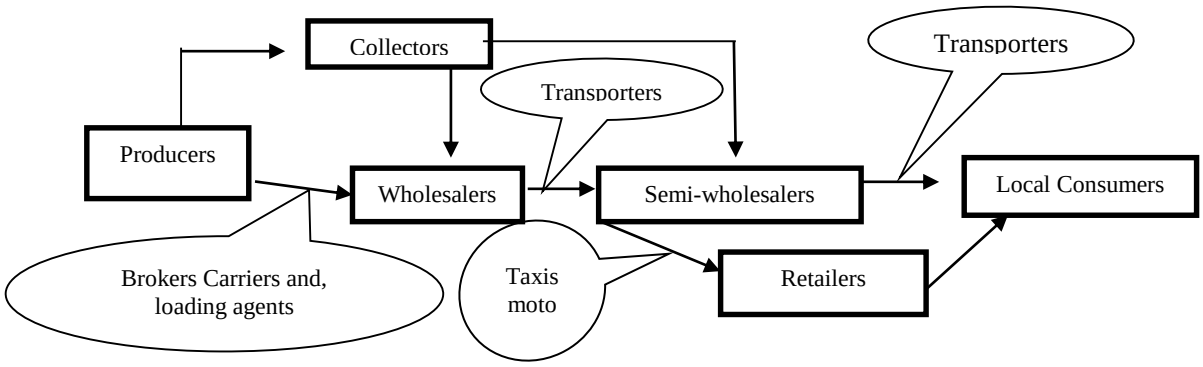



Figure 3. Map of the fresh pineapple value chain in the local markets

Source : Survey data, 2013.

*The value chain of fresh pineapple on the sub-regional market*

These are flows to Nigeria, to the hinterland countries and to the other countries in the sub-region. As shown in Figure 4, the export of fresh pineapple to the sub-region is carried out by wholesalers who receive the products directly from producers and/or through collectors and supply consumers in the sub-region. These wholesalers own the means of transport used. It is a form of vertical integration which reduces their transaction costs and the waste of time and thus increases their profit and makes it possible to honor commitments towards customers. First, these vehicles, which were small 404 or 504 tarpaulin cars, were gradually replaced by trucks that could contain the load of 6 to 8 tarpaulin, or 15 to 20 ton of pineapple. This increases their purchasing and supply capacity. About 50 % of these wholesalers have sales contracts with Nigerian traders. This chain benefits from the support of the services of carriers, loading workers and direct sellers who inform wholesalers about the availability or not of the product. But these informal exporters, to avoid decay

of the product and to respect their commitment toward their customers, are forced to pay 10,000 F CFA and more per load while trying to cross the border.

The flow towards the hinterland countries via the Cotonou-Malanville or Cotonou -Porga axis has faded during the long period of the degradation of the track (the Cotonou -Bohicon portion) ; but it was animated by the transporters of the products Tankers loading the fruit onto their tanks. These carriers, because of the perish ability of the product; mainly get their supplies from Sèhouè, the last market located towards the end of the degraded portion. During lent, the group of carriers is enlarged by a few traders who supply not only the inside of the country but also the hinterland countries. The constraints of this chain are linked to police and customs harassment, the use of standard weighing units, the obsolescence of transport vehicles and the inexistence of sales contracts between the various players.

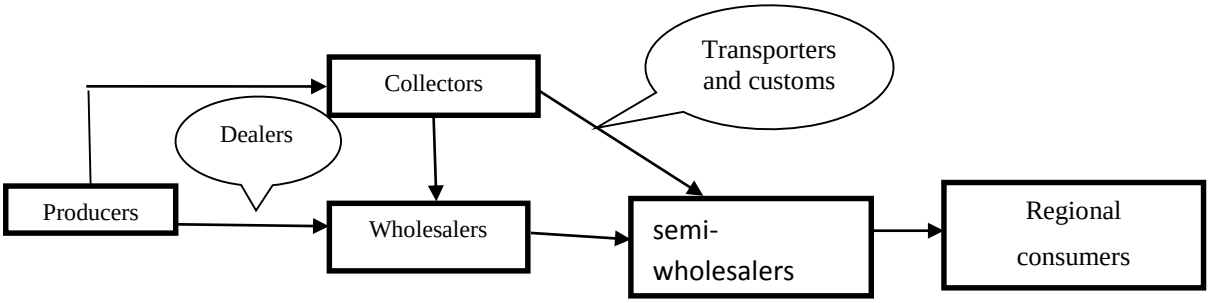



Figure 4. Cartography of the value chain of fresh pineapple for regional markets

Source : Survey data, 2013.

*The fresh pineapple value chain on the European market*

As shown in Figure 5, the pineapple intended for the European market is delivered to exporters (either directly by producers and/or collectors) through brokers. Most of the exporters are large producers with great financial capacity and with more than 5 hectares of pineapple. Thus, they supplement their production with that of small producers; which explains the mass selection they operate in the later. They support them technically and/or financially so that production can meet the requirements of the European market. These producers whose fields are followed for months are informed one week before harvest so that the sorting can be carried out. The lack of contracts between the two parties means that the clauses are not often respected: either the producer finds a better supplier, or the exporter can no longer buy, or when he arrives, he buys on credit and he does not refund exactly the amount declared at the time of purchase.

In general, like their counterparts supplying the sub-region, the exporters supplying the product to the European market invest in refrigerated trucks for

a better condition of transport of this very perishable fruit. This chain benefits from the support of state institutions such as the phytosanitary service which certifies pineapple (MRL, traceability...) before its export, customs (road tax) and the services of carriers, freight forwarders, airport handlers and cargo workers. But it is limited by several factors, including faulty tracks and police harassment; the poor technical capacities of producers (non- compliance with crop densities, poorly performed grading, non-application of fertilizer doses according to crop densities); the leaderships war between exporters; the small quantity of pineapple exported which increases the cost of freight; the small number of companies that accept the transport of pineapple, the competition exerted by the export of reptiles (in a plane you cannot take the pineapple and the reptiles) and the manual nature of the load which deteriorates the packaging at Cotonou airport.

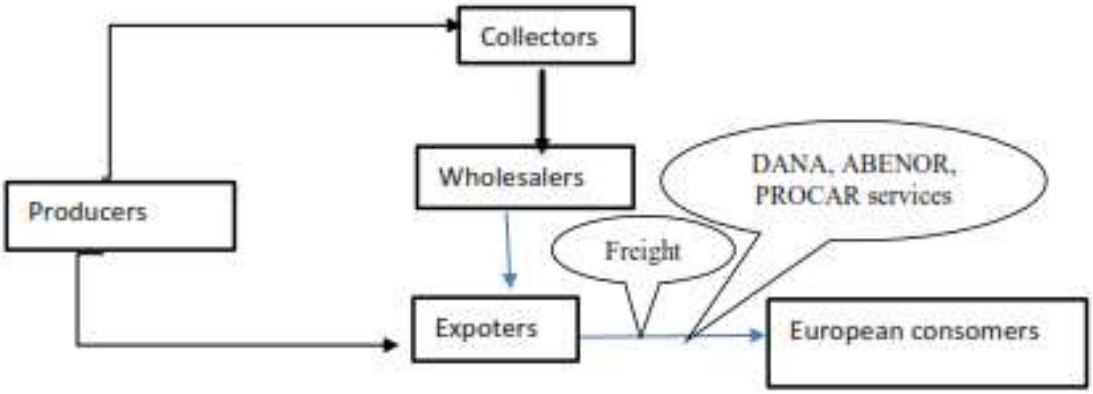



Figure 5. Map of the fresh pineapple value chain on the *European* market

Source : Survey data, 2013, 2014.

*The pineapple juice value chain on the local market*

The value chain of pineapple juice on the local market is one of the value chains in which the processing of fresh pineapple takes place (Figure 6). The transformation of pineapple into juice is gradually developing with different sizes of artisanal or semi-modern processing units. Producers deliver their products directly to processors or collectors and wholesalers who deliver them to processors. They then deliver the product of their work to restaurants and bars in urban centers where consumers enjoy it. This chain benefits from the significant support of the certification and control department of the Food and Applied Nutrition Department (DANA) or the Beninese Agency for Standardization (ABeNOR) ; the support structures that support it technically and /or financially are projects such as the Rural Economic Growth Support Project (PACER), the IFAD intervention program in Rural Benin (PROCAR), the Framework Program for Support to Agricultural Diversification (PROCAD) of the World Bank and organizations such as the Network of Pineapple

Producers in Benin (REPAB), the Union of Processors of Fruits and Vegetables of Benin (UTRAFEL).

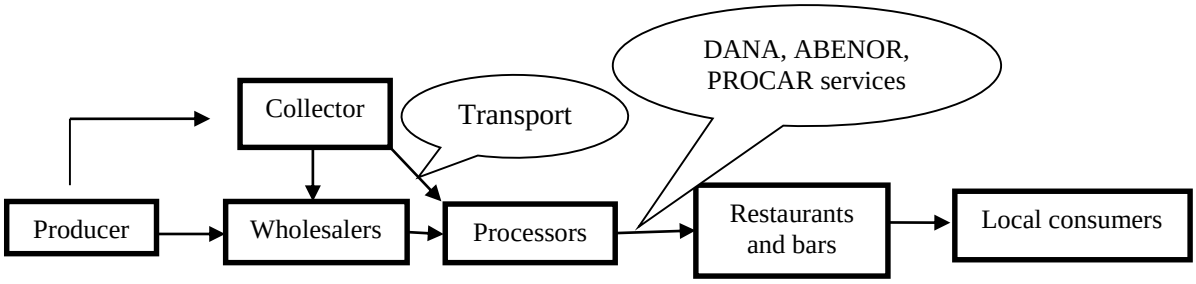



Figure 6. Map of the pineapple juice value chain on the local market

Source: Survey data, 2013, 2014.

*The pineapple juice chain value on the regional market*

Like the previous value chain, producers deliver pineapple to collectors and wholesalers who deliver them to processors or they are directly served by producers (Figure 7). Processors supply the major capital of importing countries by boat, plane or by land. Only the big processing factories regularly export the juice to Senegal (Initiative to Revive the Pineapple (IRA)) and to Morocco (FRUITILOU). Small units only benefit from regional fairs and in this case, they are supported by the aforementioned projects which support them technically and financially. This chain also benefits from the support of the association of processors, transporters and structures responsible for quality control such as DANA and ABENOR.

The major constraint of these last two chains is the lack of funding, the lack of packaging which is imported at random and the high cost of certification which is difficult for a fledgling company to bear. Indelicate processors who are not certified deliver locally products of questionable quality because they are not checked by the competent structures.

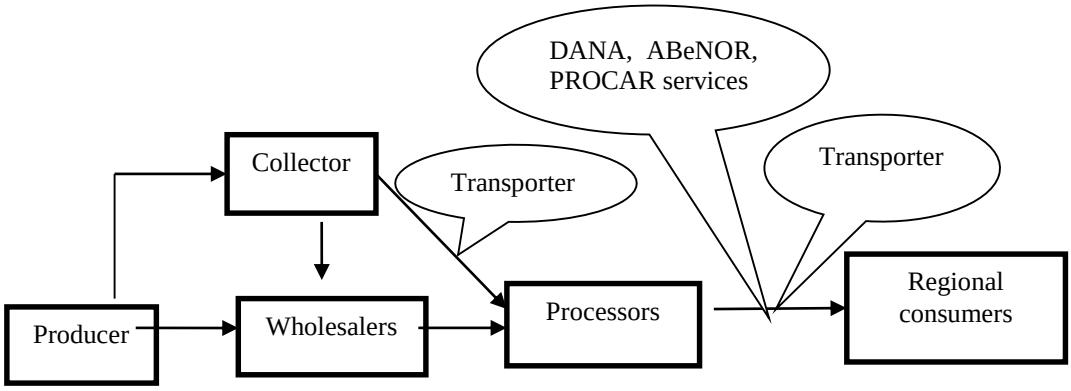



Figure 7. Map of the pineapple juice value chain on the regional market

Source: Survey data, 2013, 2014.

*The Dried pineapple chain value for the European market*

The dried pineapple value chain for the European market is led by various players (Figure 8). Pineapple producers deliver the fruit either to collectors or wholesalers who supply fresh pineapple to the dryers which can be directly supplied by producers or they use fruits from their own production. These processors supply European capitals by exporting the dried pineapple pulp without intermediaries. The major constraint of this chain, like most of the other chains is the high cost of energy, the lack of qualified manpower and the lack of financing and packaging.

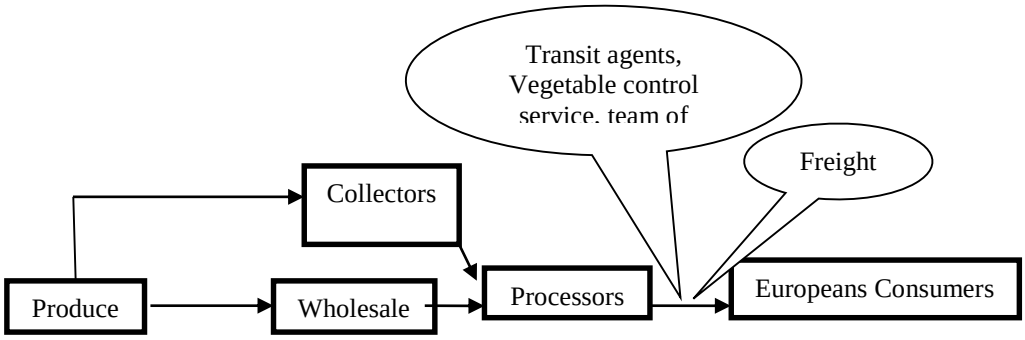



Figure 8. Map of the dried pineapple value chain for European markets

Source: Survey data, 2013, 2014.

*The waste value chain*

Pineapple is a crop whose production is ensured by suckers which are growths that come out at the same time at the base of the fruit (bulbils), on the stem of the plant (cayeux) and on the fruit (crown). Only bulbs and cayeux are used for planting. While sugarloaf can produce 8 to 15 rejections, smooth cayenne provides only two or three. In the absence of technical supervision to have producers specializing in the supply of waste, producers in South-Benin self-source from their own fields or buy from their counterparts. The reject market

then developed and constitutes a second source of income after the sale of the fruits. Releases of smooth cayenne are more expensive than those of sugarloaf and are one of the reasons for its low adoption (Biaou & Biaou, 2014). The limits of this value chain are the aging of cultivars, the lack of outlets, especially for sugarloaf, and the problem of transporting suckers from one field to another when large areas are exploited.

*Distribution of Beninese pineapple worldwide*.

The analysis in Figure 9 shows that the major part (70.14 %) of the pineapple produced in Benin is exported to Nigeria followed by national consumption (13.58 % including 10.55 % in Cotonou, 3.03 % in Porto-Novo, Ouidah and the center of the country). Only 6.57 % of this production is valued by local processing units which mainly produce juice and dried pineapple. These units are in full expansion and it is hoped that larger parts of this fruit will be processed in the future. The export of fresh pineapple to the hinterland countries (5.2 %) and the UE (4.46 %) remains far below that of Nigeria. These flows indicate that nearly 80 % of Beninese pineapples are sold in Nigeria and in the hinterland countries. Pineapple is indeed a product that promotes integration by increasing trade between Benin and its neighbors. But no statistics exist to testify to these exchanges. There are on average 50 vehicles supplying Nigeria per day that is to say almost 120 tons of fresh pineapple and more than 10 tankers which transport around 10 tons for the hinterland countries. To all this are added the pineapple derivatives which are traded not only with these hinterland countries and Nigeria but also with the Maghreb countries. Thus, without these neighboring countries, the pineapple will eventually collapse.

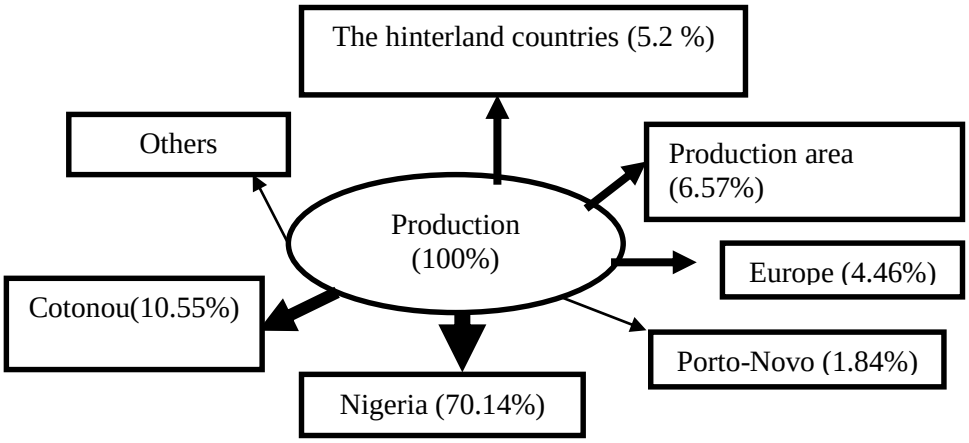



Figure 9. Distribution of the pineapple flow to the different destinations

Source: Survey data, 2013, 2014.

*Average prices on different markets*

Pineapple prices varied from market to market. And for a given market, these prices varied according to the periods of the year, the nature of the pineapple, (good, degraded condition, pineapple variety, etc.). While in the production area the price varies between 40 and 125 F FCFA per kg, in the urban centers of the south Benin these prices oscillated between 80 and 200 and in the border areas of the south between 125 and 250 FCFA per kg. In the markets of the northern urban centers, these prices were slightly higher than those of the southern border markets; but in the northern border markets, they were close to those of the Lagos market, varying between 200 and 500 FCFA per kilogram.

In the markets of neighboring countries, particularly their capitals, the prices per kg of fresh pineapple are relatively very high, ranging between 600 and 900 FCFA (Table 1). The Burkinabè market is regularly supplied by Côte d'Ivoire by train; this is why those prices fluctuate only slightly. As the fruits are not weighed regularly on these markets, we have provided the ranges of their variations per kg.

Table 1. Average price / kg of retail price of fresh pineapple on the national markets and those of the sub-region between May 2014 and June 2015

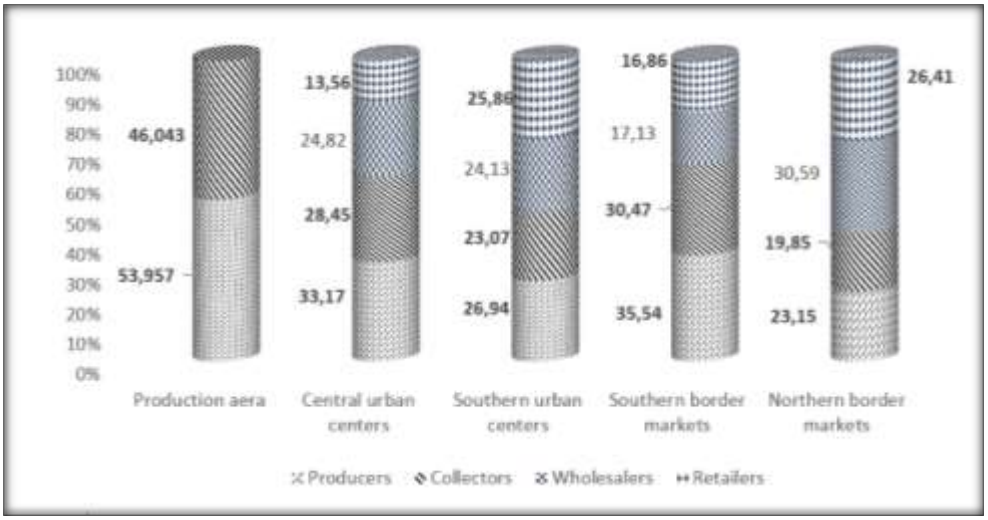
| Local markets | Price (FCFA/kg) |
|---|---|
| Production area | 77.06 (16.41) |
| southern urban centers | 82.19 (33,63) |
| central urban centers | 95.96 (32.69) |
| Northern urban centers | 165.55 (49.76) |
| Southern border | 110.95 (28.36) |
| Northern border | 358.32 (125.46) |
| Foreign markets | |
| Niamey | 750.77 (225.05) |
| Lagos | 355.45 (194.25) |
| Ouagadougou | 675,67 (215.08) |
| France - Europe | 1350,75(175,65) |

Source: Survey data, 2014 and 2015. ( ) standard error

*Sharing the values of the pineapple value chains*

*Distribution of added value of local fresh pineapple chains*

In the production area, producers are relatively better off because the only intermediary is the collector. The added value created is shared between these two actors and the producer owns around 53 %. On the other hand, at the level of other local markets, the added values of producers are relatively lower although they are higher than those of other agents except in the northern border markets where they are lower (Figure 10). The shares of added value are almost equal for the actors in the markets of the southern urban centers but very unequal on the other markets. As the wholesale markets are not far




Source : Survey data, 2013 and 2014.

Figure 10. Distribution of profits of pineapple value chains on local markets

from the markets in the production area, information is shared between the different actors and the shares of the added value are almost equal for all actors (Arrow, 1998). Otherwise, wholesalers and semi-wholesalers have the highest value-added shares in the northern border markets while those in the southern border markets have small shares of these added values. Wholesalers and semi-wholesalers in the southern border markets use small means of transport, which increases their intermediate costs which reduce their profit margins. The fluidity of information means that no one player holds the market in the southern part, which is the production area. But the further away the destination markets are, the less informed the producers are and the more they are penalized, i.e. the less their market share is.

*Distribution of the values of the outer chains of fresh pineapple*

Analysis of the distribution of profits between the actors in the fresh pineapple chains shows that export wholesalers take the lion's share by pocketing respectively 31.54 %; 86.74 % and 78.19 % of the profit from the export of fresh pineapple to Nigeria, the hinterland countries and Europe. The profit shares of exporters of fresh pineapples to Europe and the hinterland countries completely overwhelm those which the other players together gain. While the producer's profits represent respectively 29.2 % and 19.99 % of the profits of the actors of the local markets and of the Nigerian circuit, they represent only 3.87 % and 6.37 % of the total profit of the actors of the circuits of hinterland and Europe (Figure 11). At the same time, those of exporters represent nearly 87 % and more than 78 % for exports to hinterland countries and Europe. This confirms that the producers do not control the outside chains. There is a lack of transparency in the external pineapple chains and only the wholesalers who are better informed take better advantage of these chains; thus confirming the theory of Arrow (1998) stating that the best informed actors profit from remunerative markets.

Very few studies have compared the earnings of value chain actors. Fabre *et al.,* (2021) compared the price structure of the sub-chains of the pineapple value chain, sub-chains designating pineapple production systems. It is shown that the urban sub-chain, the most intensive, improves product quality and allows for a high selling price but loses foreign exchange due to imported inputs (fertilizer and packaging). The semi-intensive sub-chain costs less in imported inputs and generates the best operating result per kg of pineapple, and the extensive rural sub-chain generates income for small farmers and salaried jobs. Another example is the distribution of income among actors in the egg value chain (Fabre *et al.*, 2021). Large producers earn 51 % of income, small producers earn 3 %, medium producers 5 %, employees 15 %, financial charges earn 7%, miscellaneous suppliers earn 9 % and taxes on miscellaneous operations earn 10 %. This last example examines the share of income of actors in the same link according to the size of their farm without including other actors.


Figure 11. Distribution of profits between actors in the fresh pineapple value chains

Source : data, 2013.

*Distribution of the values of the pineapple juice value chains between players*

The distribution of pineapple juice profits between the players in the various circuits shows that exporters (processors) earn the highest shares of the profits generated. Processors' profits represent nearly 35 %, 69.4 %, 54.55 % and almost 74 % respectively by selling the juice on the local market, in Nigeria, in the hinterland countries and in Senegal. The shares of pineapple producers' profits fall from 18.99 % on the local market to 13.27 % on the hinterland market, to 8.93 % on the Nigerian market to 7.63 % on the European market. This distribution of profits clearly indicates that the producers of the juice control the external chains of the pineapple juice (Figure 12) because there are no intermediaries after the processing of the pineapple.

The distribution of added value in the value chains of exports of fresh pineapple and juice thus shows that local players are the most disadvantaged in these exchanges. As a result, producers lose control of the governance of value chains when it comes to the export of pineapple and its derivatives. Exporters have global profit shares that are more than 10 or 15 times that of local actors (Figure 11). While in the European and Nigerian chains, the profits of local actors (producers, collectors and wholesalers) oscillate between 6 and 7% of the global profit, those of the exporters represent 54 to 86 % of the global profit; that it is the circuit of juice or fresh pineapple. These results show that the sector does not operate in value chains and that only the most informed actors benefit from this sector. such a distribution shows that the actors do not know each other and that the actors do not recognize each other as interdependent. For an almost equitable distribution of the wealth created, an organization of producers to be able to benefit from better prices is necessary. Such an organization will make it possible to negotiate the product prices according to

its offer. It will estimate the product offered per month, facilitate group sales and negotiate prices. Like our results, these examples show that small producers earn the smallest shares of the final price or income.

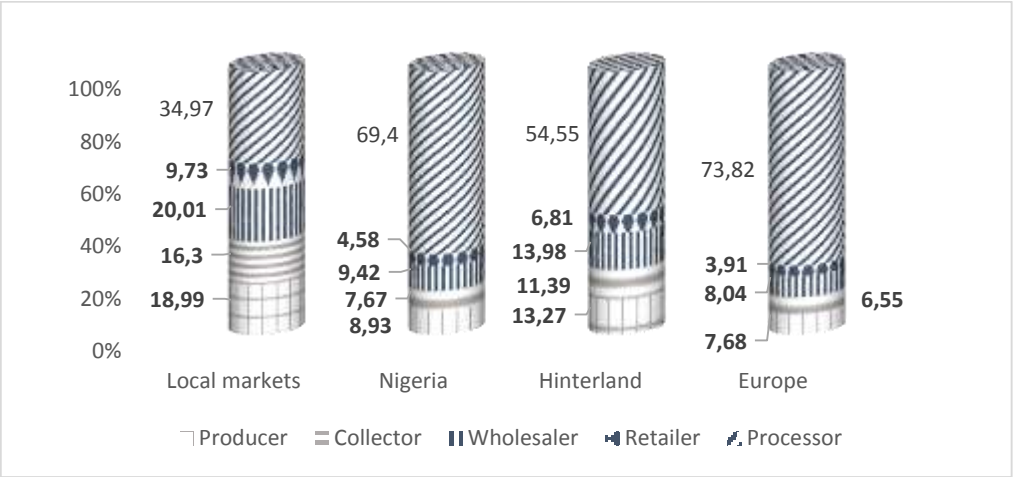



Figure 12. Distribution of profits between the players in the pineapple juice value chains

Source: Survey data, 2015.

## CONCLUSION

The pineapple flow map allows distinguishing several chains and shows that this fruit can enhance trade integration between Benin and African countries. The most important flow is the sub-regional one, in particular the Nigerian flow which drains 65 to 75 % of the Beninese pineapple, followed by the national flow which drains 10 to 15 % and the flows from the hinterland countries and European with 5 to 10% each.

The actors are in constant competition and the governance of each of the chains seems to be dictated by the players who have more information. The distribution of wealth created by the pineapple value chains is unevenly distributed between actors and chains. The shares of the external chains are monopolized by the exporters and the processors who control them while the internal chains are relatively controlled by the producers. The organization of the latter is an important element for them to take advantage of the wealth created if we wish to perpetuate this new sector.

Acknowledgement: Our sincere gratitude to the Competitive Funds of the UAC for having fully funded this study.

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