COMPARATIVE ANALYSIS OF THE ECONOMIC PROFITABILITY OF THE EXPORT OF FRESH PINEAPPLE AND ITS JUICE PRODUCED IN BENIN REPUBLIC

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Abstract:

In recent years, the rapid increase in pineapple production and its juice has been accompanied by an increase in its exports to various sub-regions. To assess the profitability of these exchanges, surveys were conducted among producers, processors and exporters of this commodity. In this study, the methodological approach includes the use and analysis through the Cost-Financial and Economic Benefit ratios nominal and effective protection coefficients and the ratio of comparative advantage. The results show that the export of fresh pineapple to hinterland countries is on the one hand, more profitable than that of pineapple juice because of the proliferation of sugar-sweetened beverages in the sub-region. On the other hand, it is more profitable than its export to Europe.

Keywords : Fresh pineapple; financial and economic; cost-benefit ratios; domestic resource costs; tradable and non-tradable factors.

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Introduction:

An efficient marketing system not only serves as a link between the producer and the consumer but actively and positively contributes to development by stimulating consumption (Harris, 1982 ; Timmer *et al*., 1986). The economic efficiency of the marketing system measures the performance with which marketing functions are performed in order to take corrective measures. If the price system is functioning properly, it provides an incentive to increasingly satisfy consumer demand for type, quality and delivery time (Obi *et al*., 2011). Thus, the production adapts to demand by responding to "price signals" by the marketing system. Harris (1982) argues that the marketing of agricultural products generates three main utilities : place utility, time utility, and form utility. In effect, it is a means to achieve the basic goals of society, which are economic growth, more equitable economic growth, more equitable distribution of income, nutritional well-being and food security (Timmer *et al*., 1986).

An effective marketing system must be oriented to the consumers needs and generates a profit for all actors involved, namely the producer, transporter, trader, processor, etc. (Timmer. 1986). However, because of the dysfunctional nature of the trading system, traders are often characterized as speculators, leading to the perception that commercial activities are unnecessary. This dysfunctional is also reflected in developing countries where road infrastructures, means of transport and communication and standards are lacking (World Bank. 2012). According to Stiglitz and Greenwald (1989), the economic decay of the least developed countries is not only related to the lack of physical or human capital, but also to the inefficient functioning of their markets.

As foreign trade is an important determinant of long-term economic growth. the trade system can also be used to show that a country or region is competitive or not in the production and export of a good. Thus, economic policies that favor export growth, investment and rade liberalization are at the heart of the strategies recommended to developing countries (World Bank. 2008). The gains from trade liberalization come from comparative advantages, which can be in the form of natural resource endowments (Hecksher-Ohlin model) increases per capita income and growth through economies of scale and technological diffusion between countries.

The competitiveness of a country is based on the notion of comparative advantage. For this purpose, various indicators are classified into trade-based and technology-based indicators (Latruffe. 2010). The trade-based indicators focus on the real exchange rate (REER), purchasing power parity (PPP) and the Purchasing Power Parity (PPP). Revealed Comparative Advantage (RCA) and its derivatives such as Revealed Exportation Advantage (REA) the relative import advantage (RIA), relative trade advantage (RCA), the net export index (NEI), etc. and the strategic management-based indicators include cost indicators. profitability and productivity indicators. The cost measurement indicators focus on the ratio of cost to resources.

Indicators include the Cost of Internal Resources (CIR) ratio, the Cost of Social Resources, the Social Benefits Cost (SBC) and production costs. From an empirical point of view. Mulder et al (2004) examining the competitiveness of the agricultural and agri-food sector in the Mercosur and the EU during the period 1991-99 showed. based on the REERs. that the Mercosur countries have experienced a decline in competitiveness since 1998 (with the exception of Paraguay. where it has remained stable).

Gorton *et al*. (2000) using the CRI ratio for the main agricultural products in Bulgaria and the Czech Republic over the period 1994-96, show that wheat and barley are more competitive for both countries, both globally and in the EU. Gorton and Davidova (2001) review several studies analyzing the international competitiveness of agriculture in the CEEC countries (Bulgaria. Czech Republic. Hungary, Poland, Romania, Slovakia, Slovenia) between 1992 and 1998 based on the CRI ratio and farm-level data. They find that plant products are more competitive internationally than animal products and that in the field crop sector, wheat and sunflower are the most competitive. After examining the studies using the ratio for the same CEEC countries between 1989 and 1998. Bojnec (2003) also concludes that livestock production is less competitive internationally. The perpetuation of pineapple production essentially cultivated in the Atlantic department in the south of Benin Republic, depends on the efficiency of its marketing. According to Biaou *et al*., (2016), nearly 80% of pineapple produced in Benin and more than 80% of the extracted juice, are exported to the sub-region.

The main objective of this paper aims to analyze the economic profitability of export of fresh pineapple and its juice to the sub-region. Specifically, it intends to show if the export of fresh pineapple to hinterland countries is more profitable than that is exported to Europe.

1. METHODOLOGICAL APPROACHES

1.1 Methods of analysis

Since market prices do not reflect the true economic value of goods because of distortions in their operation, the Policy Analysis Matrix (PAM) uses economic prices. to correct them, to show the discrepancies between the economic accounts and the financial accounts of agents and to analyze the impacts of government policies on prices and on the competitiveness (Pearson & Monke. 1989). Structurally. MAP is composed of two types of budgets : one budget evaluated at the market or financial price (financial budget) and the other at social opportunity costs or economic price (economic budget) where the values (prices. costs. profits) are those that would be observed in a situation of free trade or absence of distortions (table 1). For this purpose, all factors of the production system are divided into tradable and non-tradable factors.

I's translates the products and the j's, the destinations of the products. The parameters of these rows in table 1 are:

Aij, the gross financial revenue from the sale of good i ;

Bij, the financial costs of exchangeable factors for the production of good i

Cij, the financial costs of non-tradable factors for the production of good i

Dij, the financial profit of the sale of good i ;

Eij, the economic income from the sale of good i ;

Fij, the economic costs of tradable factors for the production of good i ;

Gij, the economic costs of non-tradable factors for the production of good i ;

Hij, the economic profit from the production of good i.

The divergences or convergences which are the differences by column of the elements of the first row and those of the second row are not used in this article. The indicators used to measure the profitability of pineapple and pineapple juice trade are the financial Benefit cost ratio (FBCR), economic benefit cost ratio (EBCR), domestic resource cost (DRC) and the coefficients of nominal product protection (CPNP) and coefficient of effective product protection (CEPC).

The FBCRij is a direct measure of producers' motivation to produce the good that reflects the competitiveness or efficiency of the production system. It is expressed as follows :

$$FBCR_{ij} = \frac{(B_{ij}+C_{ij})}{A_{ij}}$$

(1)

The EBCRij measures the magnitude of economic costs. It presents the social economic profitability of the activity and is calculated by :

$$EBCR_{ij} = \frac{(F_{ij}+G_{ij})}{E_{ij}}$$

(2)

Comparative advantage is assessed by the domestic resource cost ratio (DRC), which measures the efficiency of the best use of local resources ; that is the opportunity cost of producing one unit of the product using local resources. It is defined as the reference value of non-tradable factors used per unit of tradable factors.

$$\mathrm{DRC_{ij}} = \frac{\mathrm{G_{ij}}}{(\mathrm{E_{ij}}-\mathrm{F_{ij}})}$$

(3)

Thus. when the $\mathrm{DRC_{ij}}$ is between 0 and 1, the country has a comparative advantage in the production of the good based on the technology considered. In other words, the production activity is economically efficient and less costly in domestic resources. The system studied uses less internal resources than it generates value added. Such a system allows to earn foreign currency. But when the ratio is greater than the unit, it indicates otherwise that the system uses more internal resources (labor and capital) than it generates value added. When is equal to one, it reflects a case of indifference. In this case, the producer makes neither profit nor loss by producing locally or by importing the goods.

The nominal protection coefficient for products (NPCP) measures the ratio of the value of products at market price to their value at the reference price. When the NPCP is greater than one. it indicates that products are subsidized and when it is less than one. the products are taxed.

$$\mathrm{NPCP_{IJ}} = \frac{\mathrm{A_{ij}}}{\mathrm{E_{ij}}}$$

(4)

If q is the NPCP, the producer only receives $NPCP_{ij} = q * E_{ij}$, the system is therefore taxed by $t = (1 - q) * 100$.

The effective protection coefficient (EPC) is an aggregate measure of the rate of protection of the productive system that takes into account the effects of distortions on the product market and on the market for tradable inputs.

$$\mathrm{EPC_{ij}} = \frac{\mathrm{A_{ij} - B_{ij}}}{\mathrm{E_{ij} - F_{ij}}}$$

(5)

An EPC less than one (1) means that the combination of transfers on products on the one hand. and on intermediate consumption (tradable goods) on the other results in the following :

- an effective distribution of income that is lower than it would be if the application. all other things being equal. of international prices;

- a value added distributed to agents that is less than what it represents economically for the community (Fabre. 1994).

The lower these coefficients are the better the country's advantages in producing the good or service.

1.2 Data collection methods

1.2.1. Research area

This research is conducted in the Atlantic Department which produces more than 98% of the pineapple in Benin. The population of this department, estimated at more than 800.000 inhabitants (INSAE. 2013), is distributed in eight (08) administrative units or communes. Five of them are the main producers of pineapples.

1.2.2. Sampling, data collection technique and tools

The primary data used in this paper were obtained from surveys of producers, traders and processors. Ten (10) producers were randomly selected from forty (40) villages selected and distributed in the five pineapple producing communes of the department. The commune and the village are the two strata considered in this work. The selected villages were distributed between communes in proportion to the number of pineapple-producing villages in the department and the villages to be surveyed in each commune are determined

according to the weight of the pineapple area of the village in the commune. Of the 400 targeted producers. 365 responded to our interview.

Similarly, based on the list of juice producers obtained from the National Association of Pineapple Processors in Benin (ANATRAB), 45 producers were randomly selected. We had discussions with the ANATRAB office about exporting the juice in the sub-region. Concerning the traders, where such a list is not available, they were counted in each of the market days they are opened. Appointments at home were made with some of them or outside the market. The itinerant retailers were also interviewed using a questionnaire. At the end, a total of 110 traders including 5 exporters of fresh pineapple were interviewed.

1.2.3. Data collected

The data were collected from these different actors by individual interviews using a questionnaire. For fresh pineapple producers, data collected include the areas and quantities harvested and sold, the quantities of inputs used per ha, the sex ratio of the producers, his age, labor used per hectare and per cultivation operation, rental costs and the cost of renting land and labor, equipment and materials used, their costs and life span and the number of times these materials are used in the pineapple fields, etc. The questions addressed to traders, focused on modes of purchase (pre-financing, credit, or cash), product destinations, purchase and sale prices, harvesting costs, commercial charges (transport, packaging handling, and incidentals both at customs and during the traffic) loading and unloading, units of purchase and sale, level of education, age, secondary activities and difficulties encountered. At the processor level, data were collected include the equipment used, their acquisition cost, the places and the costs of purchase of the pineapple, their transport costs and those of the juice according to its destination, the quantities of pineapple processed, the quantities of juice marketed, the costs of road transport in addition to packaging charges, etc.

Secondary data is collected from institutions such as the Chamber of Agriculture, the Chamber of Commerce and Industry of Benin (CCIB), INSAE. Customs, etc. They focused on practices related to and import of agricultural products, especially pineapple and its derivatives, and pineapple and its derivatives, taxes, subsidies and other export charges.

In addition to mercurial data, 2015 average prices provided by the journal FRUITOP of France, one of the main beninese pineapple importer were used. As the mercurial data for fruit is not always available in the countries of the sub-region, data from ABC/SNV (2016) were used.

2. RESULTS AND DISCUSSION

2.1. Main export areas for pineapple and pineapple juice

Pineapple production in Benin, concentrated in the southern part of the country, has exceeded three hundred thousand tons since 2013. The volume exported to Europe represents less than 5% of this production (Biaou *et al*., 2016). Police harassment does not allow for regular supply all the regions of the country. Thus, the area of its production is saturated, while the northwest and southwest regions of the country receive it accidentally (Adegbola & Arouna, 2008). Based on the national trends of production and the needs for

pineapple consumption, this southern part of the country is clearly unable to consume the rest of this production, which is then dumped in the sub-region. Thus, about 80% in of Benin's pineapple is exported to Nigeria and neighboring countries.

Juice is the main by-product which is also sold in the sub-region and is marketed mainly in the countries of the hinterland (Niger-Burkina) and Senegal (ABC/SNV. 2016). However, at more 6% of pineapple produced in Benin, is locally processed (Biaou *et al*., 2016). According to most pineapple processors, more than 80% of their production are exported to the sub-region.

2.2. Cost-benefit ratios of pineapple and juice exports

The financial and economic cost-benefit ratios (FCBR) are lower than unity everywhere, both for fresh pineapple and for juice. But the financial ratios are everywhere higher than the economic ratios (table 2).

The analysis of the financial cost-benefit ratios (FCBR) of fresh pineapple exports shows that they vary from one producer to another, depending on the type, depending on gender, level of education, living environment and the variety cultivated. These average ratios are statistically different only by the variety grown (at the 1% level), where they are respectively 0.5436 for smooth Cayenne and 0.8461 for sugar loaf. But the average FBCRs of the juice are not statistically different regardless of the subgroup considered.

The economic cost-benefit ratios (ECBRs) of exporting fresh pineapple also vary from one producer to another and also according to the regions of export. Their averages are only statistically different only in relation to the variety grown at the 1% threshold everywhere. Overall, these average ratios are higher with Europe (0.6222) than with the hinterland countries (0.1243) and Nigeria (0.1133). Thus, exporting fresh pineapple to Europe is 5.01 times more expensive economically than with the hinterland and 5.49 times more expensive than with Nigeria. It is to understand why informal sub-regional exports dominate formal exports to Europe, even though the quality of this pineapple is well appreciated there (Arouna (Arouna & Afomassè, 2005; Arinloyé, 2013).

2.3. Comparative advantages (CRI) of pineapple exports and juice.

The coefficients of domestic resources are everywhere lower than unity, demonstrating that Benin has a comparative advantage over these countries in the production of pineapple and its juice. These domestic resource costs vary from one producer to another and are vary greatly from one exporting region to another. Examining this coefficient by pineapple export zone shows that it is very high for Europe and very low for the hinterland countries. The export of fresh pineapple to Europe costs on average 5.73 times more in domestic resources than exporting to hinterland countries and 4.19 times more than exporting to Nigeria (table 3). These high resource losses explain why pineapple produced in Benin is exported more to the subregion than to Europe. Indeed, these high CRI for Europe are essentially due to handling and freight costs, which constitute more than 57% of pineapple export costs.

Examination of these coefficients according to producer-related parameters shows that they are statistically different according to the varieties grown at the 1% threshold everywhere (Table 3). These ratios confirm the profitability of sub-regional pineapple juice exports. Overall, they have respective averages of 0.1023. 0.1288 and 0.3982 for Senegal, Nigeria and the hinterland. However, the export of fresh pineapple is more profitable to hinterland countries than the export of juice, which is more profitable when exporting to Senegal and to Nigeria. But the standard deviations of the CRI for juice show that these ratios vary greatly from one processor to another, proving strong variability in juice extraction yields. The latter depends on several factors, including the juiciness of the fruit, the mastery of extraction techniques, the production period, etc. The improvement of the juice extraction yield requires the use of efficient and adapted equipment and the production of high juice yield pineapple varieties.

2.4. Nominal protection coefficients for fresh pineapple and juice

The coefficient of nominal protection of products (CPNP) which is the quotient of the financial and economic turnover, shows that pineapple and juice producers are taxed. These coefficients indicate that pineapple producers receive only 6.57%. 9.38% and 3.73% of the economic turnover by exporting it to hinterland countries, Nigeria and Europe respectively, while juice producers receive 68.4%; 63.53% and 49.8% of the economic turnover by exporting respectively to hinterland countries. Nigeria and Senegal. Pineapple producers are more taxed when exporting to hinterland countries and Nigeria because of the various intermediaries that inflate the pineapple export channels for fresh pineapple. By exporting fresh pineapple to the countries, for example, it can be said that 93.59% of the economic turnover escape the producers and is transferred to other agents through market distortions and multiple intermediaries (table 4).

In relation to exports to Europe, these coefficients express the excessive costs of handling, transit and especially freight and other services that constitute more than 57% of the cost of this export. The problem of freight costs can only be solved by exporting by boat which is only possible by increasing production through production by expanding its cultivation in other regions of the country (Zou, Collines, Ouémé, Plateau, Mono and Couffo departments) where it is potentially possible and by significantly improving its productivity. In addition, the state can also review the handling and transit costs, which are still very high by reducing them to a quarter of their current respective values.

Since the juice producers are the exporters, these ratios also indicate that the differences in selling prices at the national levels and importing countries are small and the handling and transportation costs are low. In this way, they receive a higher share of the wealth generated than fresh pineapple producers.

1.3 Effective protection coefficients (EPC) for pineapple and juice exports

The effective protection coefficient (EPC) which is the ratio of the difference in turnover and costs of tradable factors at the market price to that same difference at the reference price. measures the effects of distortions in the product and tradable input markets simultaneously. They thus indicate an effective distribution of income to the disadvantage of producers or less value added than they would receive if they were linked to external

market prices. They are then taxed and it is the traders and other marketing services that benefited from the opportunity costs of exporting to these different countries or regions. For fresh pineapple. these coefficients of effective protection are statistically different by gender (at the 5% threshold) and by variety grown (at the 1% threshold). Thus, for example, through the export of pineapple to Europe, the value added on the exchangeable factors of producers effectively represent only 6.27% of the economic value added created on these tradable factors. The high cost of freight handling and export transit costs undermine the added value created by the factors of production such as fertilizers and pesticides and disadvantage producers which does not allow them to better benefit from the advantages from these exchanges. These export costs which vary according to the volume of exports must be reduced in order to increase prices to producers who are the ones who suffer the most from this distortion.

In relation to juice, these EPCs also vary according to the categories of juice producers and according to the importing countries. They show that juice producers receive 63.58%, 57.1% and 49.95% of the value added on tradable factors of juice by exporting it to hinterland countries, Nigeria and Senegal respectively. These coefficients, less than one, express a distribution that is unfavorable to producers/exporters of juice and show that the export of juice is taxed. These average coefficients are statistically different at the 10% for the hinterland and Nigeria depending on the technologies used and their values are 0.6358, 0.5710 and 0.4995 respectively for the hinterland countries. Nigeria and Senegal (table 5). However, it can be seen that the EPCs are higher than those for fresh pineapple exports. Thus, there is a distribution of income more in favor of juice producers than fresh pineapple producers.

Since juice producers are the exporters, the value added on tradable inputs is more concentrated in their hands. In addition, the costs of exporting juice are lower and weigh less on these added values which means that the values of these NPCs and the FPCs are close. In this way, it could be concluded that these FPCs are due to the small difference in prices between the juice producing country and the importing countries. This small price difference is essentially a reflection of the strong competition from sweetened beverages in the subregion. The search for other more profitable juice sales markets is necessary. But this will only be possible through better organization of producers, harmonization of juice production techniques and production processes (ABC/SNV. 2016).

CONCLUSION

The export of fresh pineapple and juice is profitable regardless the export zone. Fresh pineapple exported to hinterland countries is more profitable than that export to Europe. The latter costs 5.73 times in local resources and is discouraged by high freight and handling costs. Expanding the production area and strengthening the capacity of producers in using new production technologies will increase export volumes and reduce these costs. On the other hand, the export of juice to hinterland countries is less profitable than that of fresh pineapple. This faces strong competition from other sweetened beverages produced in the subregion. The increase in the percentage of pineapple processed into juice,

harmonization of juice production processes, the adoption of appropriate equipment and technologies with a high juice extraction rate and support from research to have juicier varieties will make it possible to have the necessary volumes of juice for the conquest of other African, Asian and European markets.

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Table 1. Structure of the Policy Analysis Matrix (PAM)

Indicators	Revenu	Factor costs		Profit
		Tradable	Non tradable	
Financial budget (market price)	A_{ij}	B_{ij}	Cij	D_{ij}
Economic budget (reference price)	E_{ij}	F_{ij}	G_{ij}	H_{ij}
Differences or convergences	I_{ij}	J_{ij}	K_{ij}	Lij

Source Pearson & Monke (1989).

Table 2. Average cost-benefit ratios (CBR) for fresh pineapple and pineapple juice exports by pineapple export region and producer pineapple export regions and producer parameters

Parameters	Modalities	Financial Cost-Benefit Ratios (RCBF)		Economic Cost-Benefit Ratios (ECBR)					
		Pineapple	Juice	Fresh pineapple			Pineapple juice		
				Hinterland	Nigeria	Europe	Hinterland	Nigeria	Europe
Gender	Men	0.811 (0.459)	0.721 (0.166)	0.124 (0.024)	0.114 (0.034)	0.622 (0.016)	0.562 (0.146)	0.319 (0.097)	0.304 (0.076)
	Women	0.63 (0.322)	0.877 (0.392)	0.120 (0.022)	0.107 (0.031)	0.618 (0.012)	0.622 (0.257)	0.381 (0.245)	0.358 (0.191)
	F de Fischer	2.45	2.409	0.554	0.551	1.02	0.775	0.983	1.221
Education level	No level	0.808 (0.394)		0.126 (0.023)	0.115 (0.033)	0.623 (0.015)			
	Primary	0.831 (0.506)	0.676 (0.133)	0.126 (0.029)	0.116 (0.040)	0.623 (0.018)	0.550 (0.158)	0.271 (0.124)	0.267 (0.096)
	Secondary 1	0.803 (0.570)	0.606 (0.103)	0.121 (0.022)	0.109 (0.031)	0.621 (0.014)	0.440 (0.101)	0.233 (0.076)	0.238 (0.059)
	Secondary 2	0.727 (0.323)	0.840 (0.251)	0.116 (0.017)	0.102 (0.024)	0.616 (0.011)	0.622 (0.166)	0.372 (0.133)	0.345 (0.104)
	Superior	0.595 (0.230)	0.882 (0.429)	0.114 (0.014)	0.099 (0.020)	0.615 (0.010)	0.628 (0.286)	0.391 (0.272)	0.368 (0.211)
	F de Fischer	0.667	0.822	1.589	1.591	1.575	0.684	0.684	0.759
Varieties	Smooth Cayenne	0.544 (0.331)		0.113 (0.018)	0.097 (0.025)	0.616 (0.013)			
	Sugar loaf	0.846 (0.459)		0.126 (0.025)	0.116 (0.035)	0.623 (0.016)			
	F de Fischer	22.012 ***		14.92***	14.93***	12.82***			
	Non motorized		0.797 (0.327)				0.560 (0.159)	0.328 (0.140)	0.311 (0.110)
	Motorized		0.832 (0.340)				0.626 (0.255)	0.378 (0.237)	0.355 (0.184)
	F de Fischer		0.113				0.938	0.646	0.852
Together		0.803 (0.455)	0.818 (0.332)	0.124 (0.024)	0.113 (0.034)	0.622 (0.016)	0.600 (0.222)	0.358 (0.203)	0.337 (0.159)

( ) standard error; *** significantly at 1%..

Source: Data survey. 2013 and 2015.

Table 3: Average comparative advantage (CRI) of fresh pineapple and pineapple juice exports to hinterland juice to hinterland countries. Nigeria. Senegal and Europe

Parameters	Modalities	Fresh pineapple			Pineapple juice		
		Hinterland	Nigeria	Europe	Hinterland	Nigeria	Senegal
Gender	Men	0.044 (0.026)	0.061 (0.036)	0.253 (0.028)	0.39 (0.147)	0.101 (0.069)	0.079 (0.055)
	Women	0.040 (0.024)	0.054 (0.032)	0.247 (0.024)	0.403 (0.225)	0.146 (0.122)	0.116 (0.100)
	F de Fischer	0.53	0.531	0.678	0.049	1.934	1.986
Education level	No level	0.046 (0.025)	0.063 (0.035)	0.254 (0.027)			
	Primary	0.046 (0.031)	0.064 (0.042)	0.255 (0.033)	0.421 (0.191)	0.126 (0.128)	0.100 (0.102)
	Secondary 1	0.041 (0.024)	0.056 (0.032)	0.250 (0.025)	0.276 (0.067)	0.053 (0.025)	0.042 (0.020)
	Secondary 2	0.035 (0.019)	0.049 (0.025)	0.243 (0.020)	0.453 (0.177)	0.138 (0.105)	0.107 (0.080)
	Superior	0.033 (0.015)	0.045 (0.021)	0.240 (0.017)	0.375 (0.237)	0.132 (0.122)	0.107 (0.103)
	F de Fischer	1.594	1.594	1.59	0.752	0.608	0.577
Varieties	Smooth C	0.032 (0.019)	0.044 (0.026)	0.240 (0.021)			
	Sugar loaf	0.046 (0.027)	0.063 (0.036)	0.255 (0.028)			
	F de Fischer	15.073***	15.056***	14.239***			
Technologies	Non motorized				0.392 (0.167)	0.113 (0.103)	0.086 (0.074)
	Motorized				0.403 (0.218)	0.139 (0.110)	0.113 (0.094)
	F de Fischer				0.032	0.643	1.033
Together		0.044 (0.026)	0.061 (0.036)	0.061 (0.036)	0.398 (0.197)	0.129 (0.107)	0.102 (0.087)

*** Significantly at 1%;

Source: Survey data. 2013.

Table 4. Nominal product protection coefficients (NPPC) for fresh pineapple and juice exports to hinterland countries. Nigeria. Senegal and Europe.

Parameters	Modalities	Fresh pineapple			Pineapple juice		
		Hinterland	Nigeria	Europe	Hinterland	Nigeria	Senegal
Gender	Men	0.065	0.092	0.037	0.686	0.656	0.514
		(0.022)	(0.031)	(0.012)	(0.115)	(0.110)	(0.086)
	Women	0.075	0.106	0.043	0.651	0.623	0.488
		(0.036)	(0.051)	(0.021)	(0.130)	(0.124)	(0.098)
	F de Fischer	2.625	2.626	2.631	0.827	0.827	0.827
Education level	No level	0.066	0.093	0.037			
		(0.018)	(0.025)	(0.010)			
	Primary	0.067	0.095	0.038	0.713	0.683	0.683
		(0.034)	(0.047)	(0.019)	(0.099)	(0.094)	(0.094)
	Secondary 1	0.066	0.093	0.037	0.610	0.584	0.457
		(0.018)	(0.025)	(0.010)	(0.117)	(0.112)	(0.088)
	Secondary 2	0.060	0.084	0.034	0.681	0.651	0.510
		(0.024)	(0.034)	(0.014)	(0.170)	(0.163)	(0.128)
	Superior	0.062	0.088	0.036	0.6485	0.621	0.486
		(0.113)	(0.016)	(0.006)	(0.093)	(0.089)	(0.070)
	F de Fischer	0.518	0.516	0.517	0.518	0.518	0.518
Varieties	Smooth C	0.076	0.107	0.043			
		(0.024)	(0.034)	(0.014)			
	Sugar loaf	0.064	0.091	0.036			
		(0.022)	(0.032)	(0.013)			
	F de Fischer	12.541***	12.52***	12.571***			
Technologies	Non motorized				0.635	0.607	0.476
					(0.085)	(0.081)	(0.064)
	Motorized				0.684	0.654	0.513
					(0.143)	(0.137)	(0.107)
	F de Fischer				1.691	1.116	1.161
Together		0.066	0.093	0.037	0.664	0.635	0.498
		(0.023)	(0.323)	(0.013)	(0.124)	(0.119)	(0.093)

*** Significantly at 1%;

Source: Survey data. 2013.

Table 5. Average effective protection coefficients (EPC) by importing country for pineapple and its of pineapple and its juice and some producer-related parameters.

Parameters	Modalities	Fresh pineapple			Pineapple juice		
		Hinterland	Nigeria	Europe	Hinterland	Nigeria	Senegal
Gender	Men	0.060	0.083	0.062	0.665	0.581	0.456
		(0.024)	(0.033)	(0.025)	(0.182)	(0.147)	(0.103)
	Women	0.073	0.101	0.075	0.618	0.565	0.526
		(0.039)	(0.054)	(0.040)	(0.280)	(0.302)	(0.586)
	F de Fischer	4.342**	4.338**	4.16**	0.377	0.041	0.234
Education level	No level	0.061	0.084	0.063			
		(0.020)	(0.027)	(0.020)			
	Primary	0.062	0.086	0.064	0.726	0.649	0.521
		(0.036)	(0.049)	(0.037)	(0.116)	(0.103)	(0.08)
	Secondary 1	0.059	0.081	0.061	0.595	0.537	0.428
		(0.019)	(0.026)	(0.019)	(0.124)	(0.107)	(0.078)
	Secondary 2	0.057	0.078	0.058	0.639	0.553	0.430
		(0.025)	(0.035)	(0.026)	(0.278)	(0.238)	(0.175)
	Superior	0.060	0.083	0.062	0.618	0.572	0.562
		(0.013)	(0.017)	(0.013)	(0.275)	(0.317)	(0.683)
	F de Fischer	0.35	0.351	0.353	0.203	0.13	0.185
Varieties	Smooth C	0.072	0.099	0.075			
		(0.025)	(0.034)	(0.026)			
	Sugar loaf	0.059	0.081	0.061			
		(0.024)	(0.033)	(0.025)			
	F de Fischer	14.485***	14.46***	14.299***			
Technologies	Non motorized				0.558	0.494	0.393
					(0.217)	(0.193)	(0.147)
	Motorized				0.688	0.622	0.570
					(0.255)	(0.278)	(0.582)
	F de Fischer				3.149*	2.88*	1.585
Together		0.061	0.083	0.063	0.636	0.571	0.500
		(0.025)	(0.034)	(0.026)	(0.246)	(0.253)	(0.465)

( ) Error standard ; *** ; ** et * respectively significantly at 1%. 5% et 10%.

Source: Survey data. 2013