

ANALYSIS OF THE DETERMINANTS OF THE PROFITABILITY OF CASHEW NUTS IN BENIN: CASE OF THE COMMUNES OF PARAKOU AND N'DALI

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Abstract

This study is part of the analysis of the determinants of cashew nut production in Benin. For this purpose, in the provinces of Borgou and Alibori, 80 producers and 20 traders were surveyed in 2018. The data collected were related to the size of the production holdings, the yield of the cashew nuts, the expenses and production costs; as well as profit margins. The analysis of the results from the multiple regression model based on a one-to-one elimination of the variables from the SPSS v 20 software made it possible to identify the factors that influence the profitability of the farms. These include the amount of credit used, variable costs, labor costs and capital. A regression model based on the Cobb-Douglas production function concluded that the producer's investment in the labor force remains the important parameter in order to increase income from production. In order to improve the profitability of cashew production in Benin, it is imperative to develop policies that take into account all of these identified parameters.

Key words: Benin, cashew nuts, marketing system

INTRODUCTION

Benin is one of the poorest countries in the world with an annual per capita income of 800 USD. In the United Nations Human Development Index study, Benin ranks 167 out of 188 countries with a value of 0.48 [12]. Despite an annual growth rate of 5% since 2012, poverty is a major problem in the country and improvements in the humanitarian index have not been sufficiently observed in recent years [12]. The poverty index in rural areas is quite high compared to the urban area. The proportion of those who spend less than a dollar a day is 63.5%. Poverty in the country is identified in rural areas [9]. In Benin, the agricultural sector is the primary source of wealth. Indeed, it contributes on average to 36% of the GDP and employs more than 70% of the active population in Benin and feeds a good part of the activities of the tertiary sector (RNDH, 2015) [9].

On the other hand, the 1999-2000 cotton market crisis has shown how much the dependence of the country's exports on a

single product affects economic fragility (PPAB, 2001) [8]. As a result, diversification of agricultural production has become a priority issue for the country and rural development. In this context, the Ministry of Food, Agriculture and Livestock has identified 13 products of particular importance, including cashews.

The cashew nut sector is an economically attractive alternative for Benin, which is the country's second most important agricultural export product (after cotton) (Sossou, 2004) [10].

The cashew nut is important for the national economy and generates income for planters as well as other actors in the value chain (traders, processors, exporters, etc.) (Arouna, et al., 2005) [2]. In addition to benefiting from forest products, peanuts, apples are very valuable products, both in the country and on the international market. By improving the organization of marketing and thus increasing the income of producers, this income is considered an important element in terms of providing capital to respond to agricultural activities and other needs of producers.

The analysis of the structure of the cashew marketing system should make a major contribution to the national economy through an increase in the incomes of domestic producers, is analyzed. It is therefore with this in mind that this study was carried out in the municipalities of Parakou and N'dali, which are seen as the production zones par excellence for cashew nuts.

MATERIALS AND METHODS

This study was carried out in the communes of Parakou and N'Dali, precisely in the departments of Borgou and Alibori. These areas were selected because of their significant contribution to the total production of cashews in Benin. The surveys were conducted in the period from December 2018 to January 2019. A total of 80 producers and 20 traders were surveyed.

The data collected were related to the size of the production holdings, the yield of the cashew nuts, the expenses and production costs; as well as profit margins. Based on the work of Dossa et al. (2018), Tovignan et al. (2014) and Allagbé et al. (2014) [1, 5, 11], a multiple linear regression model based on a one-to-one elimination of the variables was run using SPSS v 20 software and then made it possible to identify the factors that influence the profitability of farms. Multiple linear regression can be written as follows:

$$y = \alpha_0 + \alpha_1 x_i + \varepsilon_i \quad (1)$$

where:

y is the variable explained,

x_i the explanatory variables,

α is a constant called "intercept",

ε is the error term of the model.

A regression model based on the Cobb-Douglas production function was also developed to evaluate the effect of factors of production in agriculture on the income of cashew producers and traders. According to Germain (1969) [6], then Cette and Szpiro (1990) [4], it is a relation between the production (P) and the contributions in work

(L) and in capital (C). The most general mathematical expression of this function is:

$$P = b \cdot L^k \cdot C^j \quad (2)$$

where b, k and j are constants.

RESULTS AND DISCUSSIONS

Socioeconomic and demographic characteristics of the traders surveyed

The socio-demographic characteristics of the producers were presented according to the areas sown by them. Thus, three (3) groups were formed. The first corresponds to producers whose total area sown is between 0 and 10 ha; the second group between 11 and 30 ha then the third group represents the class of producers with more than 30 ha.

The socio-demographic characteristics discussed relate mainly to the sex of the producers, their level of education and then their use of agricultural credit. Analysis of the descriptive statistics obtained shows that the cashew producers in the communes of Parakou and N'Dali are mainly men. This conclusion was drawn considering that men represent 93.7% of the total sample, against 6.3% for women. Note that in particular a rate of 100% of man was recorded in the third group. The highest rate among women is among the first group (11.8%). This important involvement of men in the production of cashew nuts is due to the fact that cashew plantations are bequeathed from father to son as an inheritance.

From the statistics obtained, from a general point of view, 48.7% of producers can neither read nor write. This rate is due to the low level of literacy found in the rural areas of Parakou and N'Dali. In addition, 50% of the producers in the first group can read and write. Producers with large areas (groups 3) are the most educated, with a rate of 80%. Most of them have the secondary education level. In general, compared to other socio-economic studies conducted in northern Benin, cashew farmers in the Parakou and N'Dali communes have at least a higher level of education. Particularly, producers in the third group are those with the most advanced

level of education. In fact, it concerns particular inhabitants of urban areas and exercising a given function.

As for the statistics on the use of agricultural credits, it was noted that 41.2% of producers do not use agricultural credits. Note that 61.7% of producers in the first group do not take credit. This can be explained by the fact that these producers are insignificant small areas. Unlike the latter, producers in the third group all borrow from state structures. Only 29.2% of producers in the second group do not use financial lending services.

Determinants of the profitability of production

The determinants of the profitability of cashew production were identified from a multiple linear regression with SPSS v 20 software. In this model, the income of the nut producer was identified as the dependent variable in the 'analysis. Variables such as gender, marital status, educational attainment, organizational and non-organizational status, amount of credit used, fixed costs, variable input costs, labor costs and capital have been taken into account.

By eliminating the variables one by one in order to identify the best model, variables such as: the amount of credit used, capital, variable costs and labor costs were identified as the variables having an influence on the income of producers. At the same time, variables such as sex, marital status, educational attainment, organizational and non-organizational status were removed from the model.

The model obtained is globally significant at the 1% threshold ($p = 0$) with R^2 equal to 0.871. The variables identified therefore account for 87% of the income of producers and traders of cashew nuts. In addition, the index of the test F is equal to 122.854.

The model variables all have a positive and significant effect at the 1% income threshold of cashew producers and traders. Thus, the increase in the amount of the loan, the capital, the variable costs and then the labor force will lead to an increase in the income of the farm manager. Agricultural credit and the producer's investment are therefore of some importance for producers, in that they enable them to improve their income (Miassi et al., 2019) [7]. Note that Balogoun et al. (2014) [3] identify producers' access to credit as a determinant of annual income from the sale of cashew nuts in Benin. The increase in production-related expenses and the labor force also remain important parameters in order to increase the income from production. By increasing these costs, the farm manager gets better product from his farm.

Starting from the results of the model, unlike the amount of the loan, capital, variable costs, the labor force mobilized by the farm manager has a much larger effect (114,662). In other words, it will be easier to boost the income from production by investing more in the workforce.

The following table presents the results of the regression.

Table 1. Regression Analysis Results

Variables	Coefficient	Standard Error	t	Probability	Multiple statistical relations	
					Tolerance	VIF
Amount of the loan	0.914	0.102	8,937	0.000	0.717	1395
Capital	0.627	0,184	3,410	0.001	0.386	2590
Variable costs	0.138	0.057	2,446	0.017	0.318	3142
Labor costs	114,662	19,010	6,032	0.000	0.592	1.690

Source: Model estimate results (2019).

Effect of factors of production on income

The Cobb-Douglas function was used to assess the effect of the factors of production on the income of cashew producers and traders. In this function, income was considered to be the dependent variable,

followed by capital, labor and the space occupied for production as the independent variable.

The results of the analyzes are presented in Table 2.

The results obtained make it possible to rewrite the production function as follows:

$$\text{Income} = 0.081 \times 0.721 (\text{Capital}) \times 0.987 (\text{labor}) \times 0.492 (\text{cultivated area})$$

Table 2. Elasticity of production

	Capital	Labor	Cultivated area	Total
Income elasticity	0.721	0.987	0.492	2.2

Source: Model estimate results (2019)

Research results indicate that the number of factors combined for nut production is low. So we will say that there is increasing production on a scale. In particular, the increase in the labor force will have a positive effect on the income from production. This confirms the conclusions previously drawn. The total elasticity recorded is 2.2. We therefore deduce that a 10% increase in the factors of production will lead to a 22% increase in producer income.

Theoretically, in terms of production factors, a 10% increase in training capital an increase of 7.21% in income. At the same time, a 10% increase in the work force will increase revenues by 9.87%. The 10% increase in the area reserved for nut production will encourage a 4.92% increase in income. Note that the R-square (R^2) obtained is 0.903.

CONCLUSIONS

This study was part of the analysis of factors determining the profitability of cashew production in Benin. Analysis of the results shows that the amount of credit used, capital, variable costs and labor costs were identified as the variables having a positive influence on producers' income. The producer's investment in labor has been identified as the most important parameter for increasing production income. The development of policies aimed at improving income from nut production in Benin would therefore require taking these different parameters into account. This will not only facilitate the development of the national economy but will contribute to the fight against food insecurity that threatens the people of Benin.

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REFERENCES

- [1]Allagbe, C.M., Adegbola, P. Y., Ahoyo Adjovi, N. R., Komlan-Ahihou, C. M., Crinot, G. F. D. J. C. E., Hessavi, P. M., Djenontin, A. J. P., Mensah, G. A., 2014, Etude financée par le Projet Multinational d'Appui à la Filière Coton-Textile dans les quatre pays de l'Initiative Sectorielle sur le Coton (PAFICOT)- Bénin, Rapport technique d'exécution de l'INRAB, p 45.
- [2]Arouna, A., Adégbola, P. Y., Adékambi, S. A., 2005, Analyse de l'efficacité technique, allocative et économique des unités de production de noix cajou au Bénin. Communication présentée à l'Atelier National, Parakou.
- [3]Balogoun, I., Saïdou, A., Ahoton, E. L., Amadji, L.G., Ahohuendo, C.B., Adebo, I. B., Babatounde, S., Chougourou, D., Adoukonou-Sagbadja, H., Ahanchede, A., 2014, Caractérisation des systèmes de production à base d'anacardier dans les principales zones de culture au Bénin, *Agronomie Africaine*, Vol.26(1), p.14, <https://www.ajol.info/index.php/aga/article/view/104427>, 15 July 2019.
- [4]Cette, G., Szpiro, D, 1990, Les rendements d'échelle dans les IAA: Une analyse du dimensionnement des entreprises sur données de panel, *Cahiers d'économie et sociologie rurales*, No.17, p 20.
- [5]Dossa, F., Miassi, Y., Banzou, K., 2018, Onion (*Allium Cepa*) Production in Urban and Peri-Urban Areas: Financial Performance and Importance of This Activity for Market Gardeners in Southern Benin, *Current Investigations in Agriculture and Current Research*, 3(2): 13.
- [6]Germain, C., 1969, Les fonctions de production dans la littérature économique, *L'Actualité économique*, Vol. 45, No. 1, p.23, <https://doi.org/10.7202/1003595ar>, 12 May 2019.

[7]Miassi, Y.E.S., Dossa, Labiyi, I.A., Dossouhoui, S., Yabi, J. A., 2019, Production d'anacarde sous contrat au Nord-Bénin: Importance socio-économique et déterminants de la rentabilité, Journal of Agricultural Research Advances, 2019.

[8]PPAB, 2015, Etude de capitalization sur l'intervention du PPAB, p.26.

[9]RNDH, 2015, Rapport national sur le développement humain 2015: Agriculture, sécurité alimentaire, p.141.

[10]Sossou, H., 2004, La filière anacarde au Bénin: Potentialités de production et opportunités de marché.

[11]Tovignan, S., Hinvi, J., Glin, L.C., Sodjinou, E., Bonou-Zin, R., Koussahoué, S., Nicolay, G., 2014, Déterminants de la rentabilité de la production du coton biologique au Bénin'', 3 ième conférence Ouest Africaine sur l'Agriculture Biologique du 27 au 29 Août, Cotonou, Bénin, p.1.

[12]UNDP, 2015, Rapport sur le développement durable, p. 48.

