



Moor Journal of Agricultural Research

AN INTERNATIONAL JOURNAL

Published by the

Institute of Agricultural Research and Training

Obafemi Awolowo University, P.M.B. 5029, Moor Plantation, Ibadan, Nigeria.

MOOR JOURNAL OF AGRICULTURAL RESEARCH

Published by: Institute of Agricultural Research and Training, Obafemi Awolowo University, Moor Plantation, Ibadan, Oyo State, Nigeria

Abstracted in: (i) CABI
(ii) African Journal online (ajol) <http://www.inaspin.info/ajol/Mngt>

Director: **Prov. V. A. Obatolu**, B.Ed., M.Sc., Ph.D (*Human Nutrition*)

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Keywords: Calcareous mudstone; Soil properties; Taxonomic Classification; Nutrients

Introduction

Calcareous mudstone is a sedimentary rock and consolidated product of calcareous sands, limy mud and crushed shells (Anatala, 1996). It is composed of carbonates in the form of aragonite, calcite and dolomite. The mudstone formations have been referred to as River Shale group or the oldest marine carbonate sequence which are mostly impervious shale with

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Economic Evaluation of Kola-nut Processing and Marketing in South West, Nigeria.

***Adesida, F.A., Oluyole, K. A, Agulanna, F.T, Oladokun, Y. O. M., Adelusi A. A., Agboola, L.O, Ogunwolu Q. A., Ujunwa E. I and F. B. Mustopha**

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The study was carried out in South West Nigeria to evaluate the profitability and factors contributing to the sustainability of Kola-nut. Data were collected from 160 kola-nut marketers using multistage sampling technique. The first stage was the selection of two states, Ogun and Osun states being the major producer of Kola-nut in Southwest Nigeria. The second stage was the purposive selection of two Local Government Areas from each state. The third stage involved a random selection of five communities each from the selected Local Government Areas. The fourth stage involved the random selection of twenty-one (21) kola-nut marketers in each of the selected communities in Ogun State while eleven (11) kola-nut marketers were randomly selected from each of the selected communities in Osun State. Thus 105 and 55 marketers were selected from Ogun and Osun States respectively.

Data were analyzed using descriptive statistics, gross margin and linear regression. Result showed that kola-nut marketing is dominated by women. Results show that the mean age of the respondents was 64 years which shows that most of these women are elderly with quite a number of working experience in kola-nut trading. Most of them have no formal education while 20% have primary and secondary education respectively. Regression results show that the age of the traders, level of education, years of experience, packaging/preservation and transportation are major significant factors contributing to the marketing of kola-nut. Therefore, adult education, preservation and packaging techniques should be paramount for the marketers for enhanced marketing skills.

Keywords: Kola-nut, Processing, Marketing, Cash crops, Economic evaluation.

Introduction

One of the stimulant crops with ingredients that stimulate the body nervous system to produce one action or the other is kola (*Cola nitida* and *Cola acuminata*). Kola belongs to the family called *Sterculiaceae* and is native to the high rain forest zones of West Africa. It is believed that kola trees are native to Ghana and Ivory Coast and their spread to other regions where they are cultivated was brought about by humans (Chinweike, *et al.* 2020). Kola is also known to be cultivated in countries such as

Jamaica, Indonesia, and South America (Asogwa, 2011). Kola-nut tree is a woody evergreen plant which could reach a height of 10-20 meters. It possesses straight stem and large leaves which are tough with dark or green colour. The pods are usually borne in clusters with each pod containing 4-40 seeds or nuts (depending on the variety) when opened. The seeds are enclosed in soft white and thick seed coat called the testa. Each seed or embryo denoted as the kola-nut consists of two very large fleshy cotyledons united through a tiny plantlet

(Opeke, 1992).

The kola-nuts are usually in three colours: white, pink and red; each pod may contain any combination of the three colours (Kim and Frey, 2005). Kola trees require a hot, humid climate and are capable to withstand 3 months of dry season. Kola tree, being a hardy tree crop may be cultivated even in drier areas wherever ground water is available. The most suitable soil for kola-nut cultivation is a well-drained fertile soil that is rich in humus (Uguru, 2011). Nigeria accounts for about 70% of the total world production of kola-nuts (Ugwuet *al.*, 2020). It was reported that about 10 percent of the kola-nut produced in Nigeria is exported while 90 percent is consumed within the country (Ndagi and Babalola, 2012).

Figure 1 above shows the production in tons of kola-nut from 1961. The chart below shows the annual production of kola-nut in tones since independence in 1960 to year 2020 and shows that kola-nut production increased tremendously in the 60's after which the production dropped in the 70's. Since then kola-nut production in the country has been fluctuating. However,

kola-nut production reached the lowest level in 2015 of 60,000 tons but since then, there has been a sharp increase in production.

There are over 20 species of kola-nut, from which, *Cola nitida* (Gbanja) and *Cola acuminata* (Abata) happen to be the two main species grown in Nigeria. *Cola nitida* which is the only kola-nut of inter-regional and international trade has gained prominence and is highly preferred by the people of the northern and southeast Nigeria while *Cola acuminata* is highly cherished and consumed by the Yoruba of south-west of Nigeria. The opinion is widespread that kola-nut suppresses hunger, thirst and sleep (Chinweike, *et al.* 2020). Kola-nut has a bitter and sharp taste, which gets milder on drying. The major chemical components of kola-nut are caffeine, theobromine and theophylline which are xanthine derivatives (Ajewole *et al.*, 2021).

Kola-nut has many health benefits which include regulation of menstrual cycle, reducing difficult labour, treating respiratory issues, improving gastrointestinal health, boosting mental health, aiding digestion and remedying

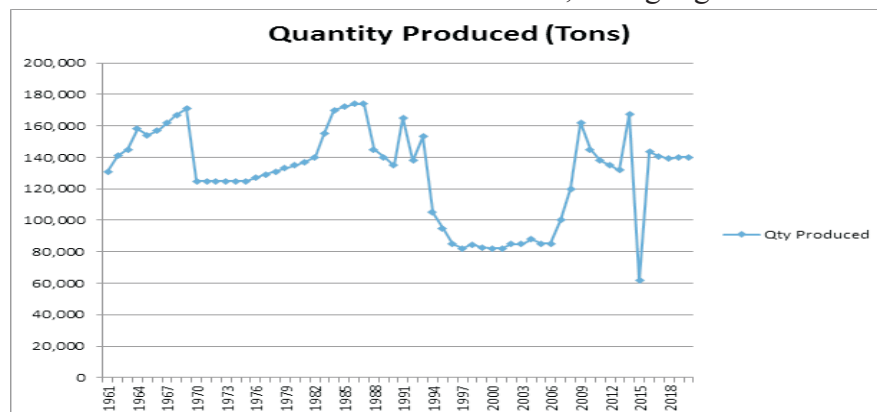


Figure 1: FAOSTAT, 2020

hangover and it produces stimulatory effects on the cardiovascular and neuroendocrine systems when consumed in large quantity (Bayer, 2020). In folkloric medicine, they were used in the treatment of parasitic infections, rheumatism, depression, asthma, whooping coughs, and low libido (Ezuruike and Prieto, 2014). Its anti-diabetic and antioxidant properties have been demonstrated in vitro and in vivo (Ayebe *et al.*, 2012). Also, amidst the rising global demand for electricity, a blend of kola-nut husks and cocoa pod husks have become a viable energy resource option for power generation (Ajewole *et al.*, 2021). Kola-nuts are extremely valued and get very much attention especially during social functions or special occasions such as wedding, naming, marriage and burial ceremonies where they are used in the entertainment of guests, visitors and well-wishers (Kanu, 2020). Kola-nut is used as one of the ingredients in the production of cola group of beverages such as Coca Cola, wine, chocolate and in confectionaries (Asogwa *et al.*, 2012). Kola-nut is also used in the manufacture of drugs in pharmaceutical industries and dyes (Jayeola, 2001). Kola-nut is sometimes used as animal feedstuff because of its high nutrients content. Broilers fed with kola-nut pod husk meal diets had an outstanding growth performance (Babatunde and Hamzat, 2005).

The pod/husk and testa of kola-nut pod which constitute over 50% of kola fruit has been a farm waste to date. The use of by-products from cocoa, coffee, cashew, palm kernel, cassava and kola-nut wastes for producing animal feeds has also been reported (Fabunmi and Arotupin,

2015). Also, due to the high potassium content of the kola-nut testa, it has been suggested as a possible ingredient for making fertilizer (Olubamiwa *et al.*, 2002). It has been estimated that over 90% of the world's kola-nut is produced in West Africa of which Nigeria contributes 50%, Cameroon 27%, Ivory Coast 16%, and Ghana 8% (FAO, 2013). In Yoruba land, women are found to predominate in the retail marketing of agricultural products, and a high proportion of women in the rural areas appear to earn most of their incomes from trade on agricultural commodities.

Adedoyin (2005) noted that availability and effectiveness of marketing infrastructures like storage facilities, transportation facilities and communication networks determine the ability of marketing system to effectively and efficiently perform its developmental function; furthermore, the study revealed that adequate transportation network must exist for effective distribution of kola-nut to take place. According to Ajani (2012), the major problems of kola marketing were inadequate capital, poor storage facilities and high cost of transportation, inadequate supply of kola-nut, poor marketing experience and other problems emanating from sprouting and theft.

Marketing of fresh kola-nuts is carried out by the farmers who sell their kola-nut produce at the farm gate or village site to either the wholesalers in rural and urban areas or directly to the retailers who are mostly women (Ajewole *et al.*, 2021). It was also noted by (Eusebus, 2004) that small holder farmers are located in remote areas with poor marketing information and market infrastructure. The marketing

information needed or required by these farmers as well as marketers include policies which influence prices, how to store kola-nut, insecticides used during storage, marketing outlets, handling of kola-nut and so on. Therefore, it is imperative to undertake study on kola-nut processing and marketing in Ogun and Osun states Nigeria.

Materials and Methods

Sampling Techniques

This study was carried out in Ogun and Osun States of Nigeria. The two states fall within the rain forest zones of Nigeria with vast agricultural potentials where kola-nut, cocoa, cashew, oil palm are mostly cultivated by small / medium farm holding farmers. The types of land tenure systems prevalent in these areas are inheritance and leasehold systems. Primary data were collected using multi-stage sampling technique to select the kola-nut traders in the study areas. The first stage was the selection of two states (Ogun and Osun states) being the major producer of Kola-nut in Southwest Nigeria. The second stage was the purposive selection of two Local Government Areas from each state. Sagamu and Ijebu North were purposely selected from Ogun state while Ede and Iwo were purposively selected from Osun state. The selection of these Local Government Areas was based on the fact that they are major kola-nut producing Local Government Areas in the States. In other words, majority of the farmers in these Local Government Areas are involved in kola-nut production.

The third stage involved a random selection of five communities each from the selected

Local Government areas. The fourth stage involved the random selection of twenty-one kola-nut marketers in each of the selected communities in Ogun State while eleven (11) kola-nut marketers were randomly selected from each of the selected communities in Osun State. Thus 105 and 55 marketers were selected from Ogun and Osun States respectively.

Data Collection

Data was collected with the aid well-structured questionnaire. Data collected included: volume of kola-nut traded per year, gender, age of kola traders, educational status, marital status, years of experience in kola marketing, variety of kola purchased, labour costs, cost of materials, cost of purchase of fresh kola-nuts and sales of processed kola-nuts as well as income from kola marketed per year.

Analytical Techniques: The analytical techniques used included descriptive statistics, gross margin and ordinary least square regression analysis (OLS). Descriptive statistics was used to profile the socio-economic characteristics of the respondents. OLS regression analysis was used to capture the determinants of kola-nut processing and marketing while gross margin analysis was used to determine the profitability of the enterprise. The model is given as follows:

$$Q = \hat{\alpha}_0 + \hat{\alpha}_1 X_1 + \hat{\alpha}_2 X_2 + \hat{\alpha}_3 X_3 + \hat{\alpha}_4 X_4 + \hat{\alpha}_5 X_5 + \hat{\alpha}_6 X_6 + \hat{\alpha}_7 X_7 + \hat{\alpha}_8 X_8 + \hat{\alpha}_9 X_9 + \hat{\alpha}_{10} X_{10} + e$$

Where:

Q = Quantity of kola-nut traded (Kg),

$\hat{\alpha}_s$ = Parameters estimated

$\hat{\alpha}_0$ = the constant term

X_s = the independent variables

The explanatory variables are;

X_1 = age (Years)

X_2 = marital status

X_3 = educational level

X_4 = years of experience (Years)

X_5 = cost of fetching water (?)

X_6 = cost of peeling/washing (?)

X_7 = cost of packaging/preservation (?)

X_8 = cost of transportation (?)

e_i = error terms

Gross margin analysis was used to estimate the cost of purchasing fresh kola-nut as well as the revenue generated from the sales of processed kola-nut.

$$TC = TFC + TVC \quad (i)$$

Where,

TC = Total Cost

TFC = Total Fixed Cost

TVC = Total Variable Cost

Total revenue generated from the sales of the processed kola-nuts was calculated thus;

$$\text{Net Income (NI)} = GR - TC \dots\dots\dots (ii)$$

Where,

GR = Gross Revenue

TC = Total Cost

$$\text{Net Income per trader} = \text{Net Income} / \text{Total number of traders} \dots\dots\dots (iii)$$

Table 1 above shows that 60% of the respondents are within the age bracket 50-69 years with mean age of 64 ± 10.16 which shows that most of the women are elderly with quite a number of working experience in kola-nut trading which averaged 40 years. This shows that most of these women have been into kola-nut business since their

teenage years. The implication of this is that young women need to be involved in kola-nut trading. Also, 74% of the women are married while 26% are widowed. Most of the women (60%) have no formal education while 20% have primary education and secondary education respectively. The table also shows that the marketers only trade in *Cola. nitida*. This possibly may be due to the preference for this variety of kola-nut in the study areas.

Table 2 below shows the processing and material cost of fresh kola-nut purchased and processed by 160 marketers from Ogun and Osun States. The average cost for each labour and material cost was calculated by dividing the total cost by the total number of the sampled traders which was 160. The total cost of labour as indicated in the table was ₦188,980 while the average total cost was ₦1,181.13. Also, the total material cost and average material cost are ₦441,920 and ₦2,762 respectively.

Table 3 above shows the total cost of purchase and processing of fresh kola-nuts as well as returns from the sales of the processed kola-nuts from 160 traders in Ogun and Osun State. The result shows that the total variable cost was ₦630,900. The total fixed cost and the total cost were ₦351,350 and ₦982,250 respectively. The gross revenue from the sales of processed kola-nuts from the 160 traders was ₦3,667,000. The net income from the sales of the kola-nut by all the 160 traders and the net income per trader are ₦2,684,750 and ₦16,779.69 respectively. However, considering the average total cost of ₦6,139.06 and the net income per trader of

Table 1: Socio -Economic Characteristics of the Respondents .

Variables	Frequency	Percentage
States		
Ogun	105	65.62
Osun	55	34.38
Total	160	100
Gender		
Female	160	160
Age(Years)		
40-49	23	14.38
50-59	21	13.13
60-69	74	46.25
70-79	42	26.26
Mean = 64.44	64	
SD = 10.16		
Marital Status		
Married	118	73.73
Widowed	42	26.25
Educational Status		
No formal Educational	96	60
Primary Educational	32	20
Secondary Education	32	20
Farming		
Experience(Years)		
25-33	42	26.88
34-42	56	6.25
43-51	40	33.76
52-60	22	6.88
Mean= 39.89	40	
SD = 10.10		

*Field Survey, 2020***Table 2: Labour and Material Costs of Processing Fresh Kola-nut**

S/no	Labour Cost (₦)	Average cost (₦) / Marketer	Total Amount (₦)
1	Fetching water	250.31	40,050
2	Peeling/ washing	330.63	52,900
3	Packaging/ Preservation	185.31	29,650
4	Transportation	414.88	66,380
	Total Labour Cost	1,181.13	188,980
	Material Cost (₦)		
1	Cost of water	266.88	42,700
2	Cost of chemicals/Preservatives	150.00	24,000
3	Cost of leaves	38.75	6,200
4	Cost of Nylon	110.44	17,670
	Total Material Cost	2,762	441,920
	Total Variable Cost	3943.13	630,900
1	Cost of reservoir	961.56	153,850
2	Cost of basin	775.00	124,000
3	Cost of basket	453.13	73,500
	Total Fixed cost	2195.94	351,350

Field Survey, 2020.

Table 3: Cost and Return Analysis

S/no	Items	Amount (N)
1	Total Variable Cost	630,900
2	Total Fixed Cost	351,350
3	Total Cost	982,250
4	Gross Income from sales of kola nut	3,667,000
5	Net Income	2,684,750
6	Net Income per trader	16,779.69

Field Survey, 2020

16,779.69, it could be safely deduced that kola-nut business is a profitable venture in the sampled areas. The profit level can be increased through the expansion of their kola-nut businesses. The expansion of their kola-nut trade is however achievable through the construction of good roads to the rural areas where kola-nuts are produced and also provision of good

storage and processing facilities to the kola-nut traders. The traders should also be encouraged to join cooperative societies so as to access credits to expand their businesses.

Table 4 below shows the result of the ordinary least square regression analysis. The result reveals that the regressors could explain 64% of the variation in the

**Table 4: Result of OLS Regression Analysis Showing the Determinants
of Quantity of Marketed Kola-nut.**

Variables	Coefficients	t-values
(Constant)	742.77	.533
Age	53.43**	2.240
Marital Status	-765.05**	-4.870
Educational Level	619.37**	2.957
Years of Experience	6.65	.311
Fetching Water	-2.68**	-2.149
Peeling/Washing	-2.43**	-3.798
Packaging/Preservation	0.47	.246
Transportation	1.03*	1.765
R ²	64.643	
Adjusted R	0.401	

Field Survey, 2020. **Significant at 5%, *significant at 1%

dependent variable, that is, the coefficient of determination was 64%. However, the age of the traders, level of education, years of experience in kola-nut marketing, packaging/preservation and transportation were all positive and significant, that is, they were the major significant factors contributing to the marketing of kola-nut in the study area. On the other hand, the marital status, cost of peeling/washing and cost of fetching water though not significant but have inverse relationships with the quantity of kola-nut traded in the study areas.

Summary, Conclusion and Recommendation

Kola-nut trading is a profitable business in the study areas as shown by the net income per trader of ₦16,771.69. Thus, the kola-nut traders were able to cover their total operating costs and also made profit. However, considering the average total cost of ₦6,139.06 and the net income per trader of ₦16,779.69, it could be safely deduced that kola-nut business is a profitable venture in the sampled areas. The net profit can be increased by expanding the scope of their businesses or the quantity of kola-nut traded in the study areas.

Therefore, based on the findings, it is recommended that kola-nut traders be given some forms of adult education because most of them have no formal education. This would invariably improve their trading skills. There should also be periodic training organized by governments or NGOs for the traders on improved method of processing kola-nuts. In addition, since all the traders are female, the government should encourage school

leavers especially young male through public enlightenment and skill acquisition programs to engage in kola-nut marketing so as to reduce unemployment rate in the country. The kola-nut traders in the study areas should form cooperative societies or join existing associations to obtain loans that help promote the development of their kola businesses.

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