

Economic analysis of Kolanut in some selected markets in Southwestern Nigeria

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Abstract: There are several studies on kolanut marketing, but there is a dearth of information on its effectiveness. Thus, this study determined the efficiency of kolanut marketing in Nigeria. Two major kolanut markets were purposively selected: Gbongan in Osun and Shagamu in Ogun. A simple random sampling technique was used to select 106 kolanut marketers in Gbongan, and 96 marketers in Shagamu and information were obtained from the marketers using a well-structured questionnaire. Data were analysed using descriptive statistics, marketing efficiency and linear regression analysis. The mean age of the marketers in Gbongan was 53 years they had secondary education (46.1%), and they had a mean of 26 years of experience in kola marketing. The mean age of kolanut farmers in Shagamu was 52 years old, with primary education (41.7%) and Eighty-eight percent of the marketers need paper for processing, 64% of them were using leaves while 56% and 88% used Gamallin and Phostocin chemicals respectively. In Shagamu the average TC/kg was ₦1442, Average Total Revenue/kg was ₦19803, the profit/marketer/kg was ₦18,361 and the efficiency was 12.73 while in Gbongan the average TC/kg was ₦1833, Average Total Revenue/kg was ₦12478, profit/marketer/kg was ₦10,645 and the efficiency was 5.80. The determinants of marketing efficiency in the markets were age, marital status, educational level, type of kolanut and the price of kolanut per kg. Marketers in Shagamu are more efficient than marketers in Gbongan. Kolanut marketing in Shagamu should be properly developed to enhance higher efficiency.

Keywords: Gbongan, Kolanut, Markets, Marketers, Shagamu.

INTRODUCTION

Kolanut, an important tree crop, is regarded as one of the cash crops that serve as significant revenue source for some West African countries, including Nigeria. However according to Ugwu *et al.*, 2020 and Oluyole *et al.*, 2009 Nigeria produces almost 70% of the total quantity of kolanut produced worldwide and it is on record that close to 90 percent of Kolanut produced annually by kola farmers in Nigeria are eaten or utilized locally while about 10 percent is sold to foreign countries (Ndagi *et al.*, 2020 and Oluyole *et al.*, 2009 Nigeria produces almost 70% of the total quantity of Kolanut produced worldwide and it is on record that close to 90 percent of Kolanut produced annually by kola farmers in Nigeria are eaten or utilised locally while about 10 percent is sold to foreign countries (Ndagi *et al.*, 2012). Some other African countries where Kolanuts are produced in abundance are Ghana and Cote De'voire, where they spread to other areas where their cultivations were brought about by humans (Chinweike *et al.*, 2020). Kolanut cultivation is also known to take place in countries such as Jamaica, Indonesia, and South America (Asogwa, 2011).

Kolanut, a stimulant tree crop belongs to the family known as *sterculiaceae*. A typical kola tree is a woody evergreen plant which could attain heights between 10-20 meters. The stem is straight with large leaves that are tough and dark or green in colouration. It produces pods that are usually borne in clusters, each containing 4-40 seeds or nuts, depending on the variety. Each seed is enclosed in a soft white, thick seed coat known as the testa. Every seed referred to as Kolanut comprises of two very large fleshy cotyledons joined together through a tiny plantlet (Opeke, 1992). Kolanut seeds or embryo may come in three colours: white, pink or

red: while any pod may have any combination of the three colours (Kim and Frey, 2005). Though kola trees require a hot humid climate for survival and are able to withstand three months of dry season, they are very resilient and could survive in a drier area where ground water is available. Concerning suitable climatic condition for kola, Kolanut trees grow under the same climatic conditions as cocoa, but it is less demanding in its soil requirement (Famaye, 2012). However, according to Uguru, 2011, the most suitable soil for Kolanut cultivation is properly drained fertile soil which is also rich in humus.

Kolanut is particularly important in the religious customs as well as people's social life in Nigeria. It is a powerful cultural symbol which is a crucial part of local community meetings. It is also offered to elders to show respect and as a sacred offering. High premium is also placed on Kolanut especially during social functions such as naming and wedding ceremonies where it is used for entertainment of guests and visitors (Kanu, 2020).

Kolanut is chewed or masticated by people especially by elders as a stimulant. It excites the Central Nervous System (CNS) to produce one action or the other. There are widespread opinions that kolanut suppresses sleep, hunger and thirst (Chinweike *et al.*, 2020). In folkloric and traditional medicine, Kolanuts are utilised as parts of the treatments for illnesses such as rheumatism, asthma, whooping coughs, low libido, and parasitic infections (Asogwa *et al.*, 2011). There are about 50 species of kolanut and only 7 species are edible. However, *cola nitida* and *cola acuminata* are the two main species grown in Nigeria and commercially exploited. *Cola nitida* (Gbanja) which is regarded as kolanut of international and inter-regional trade is known to be the best and consumed

mainly by the northerners and some people from Southeastern Nigeria while *cola acuminata* is highly cherished and consumed by the Yoruba tribe (Asogwa *et al.*, 2006).

Kolanut trade is the only livelihood and economic survival for many families involved in kola farming in Nigeria. Kola is also exported in large amounts to some African nations, Europe and America (Ugwu *et al.*, 2020). As earlier stated, about 70% of the world Kolanut production comes from Nigeria but the production fluctuates from year to year since independence. Kolanut consumption is on the rise even though its production is declining because some of the Kolanut trees in Nigeria have very low yield. This could be adduced to poor natural pollination, overage trees, pests and diseases (Asogwa *et al.*, 2006).

In terms of marketing, the marketing of freshly harvested Kolanuts is an activity carried out by the Kolanut farmers who sometimes sell their Kolanuts produce to buyers at village markets. They sometimes sell directly to wholesalers/retailers who are mostly women (Ajewole *et al.*, 2021). Eusebus (2004) also observed that farmers who are small farm holders in rural areas are associated with inadequate market information. The information needed by these farmers as well as marketers, include but not limited to government policies, storage, chemicals and markets.

The broad objective of the study was to determine the economic analysis of kolanuts in selected markets in Southwestern Nigeria. The specific objectives are to:

- a. profile the socioeconomic characteristics of kolanut farmers,
- b. determine kolanut processing and storage in the selected markets
- c. determine the profitability of selected kolanut markets in the study area, and
- d. determine the factors affecting kolanut marketing efficiency in the study area

METHODOLOGY

The study area is Nigeria. Two major kolanut markets were purposively selected. Gbongan in Osun state and Shagamu in Ogun State. One hundred and twelve kolanut marketers were randomly selected in Gbongan and 100 were selected in Shagamu. After sorting out for missing data in Gbongan 106 marketers’ information was used. In Shagamu, after sorting out for missing data 96 marketers’ information was used.

Descriptive statistics, marketing efficiency and linear regression. Descriptive statistics involved the use of means, frequencies and percentages.

Marketing efficiency = Output/Input. Linear Regression Analysis – this was used to determine the factors that affect the marketing efficiency of kolanut marketers.

The implicit model is:

$$Y_i = \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_p X_{ip} + e_i \dots \dots \dots (i)$$

Where: Y= Marketing efficiency

e_i = error term

The X_i s are Age of marketer, marital status, educational level, years of experience, type of kolanuts and price of kola.

RESULTS AND DISCUSSION

Socioeconomic characteristics

Table 1 presented the socioeconomic characteristics of kolanut marketers in Nigeria. Two markets were selected namely Gbongan and Shagamu. Fifty two percent of the marketers were from Gbongan market while 48% were from Shagamu market. Sixty eight percent of the marketers were between 31-60 years while 4% are \leq 30years and 28% are above 60 years. The mean age of kolanut marketers is 52.4 ± 11.0 . More than half of the marketers were in their active year still full of energy to do their marketing job. This age is to their advantage as they can work more and gain more profit. The ability to take risk and do manual work decrease as age increases (Ariyo *et al.*, 2021; Nwawuisi *et al.*, 2007). Eight out of ten kolanut marketers were married. Marriage is a great advantage to their marketing business as their spouses and children could greatly assist them (unpaid labour) (Albert *et al.*, 2017). Seventy two percent of the marketers have at least a primary education. This revealed that they are literate, and education plays a key role in accepting new marketing skills and technology (Nwaru *et al.*, 2004; Esiobu *et al.*, 2014). All the kolanut marketers belonged to a social economic group. This would play a great role in improving their business and for all of them to belong to this group it showed that it has great benefits to them and their business. The mean years of experience for kolanut marketers in the study area was 26.9 ± 9.3 and 68% of them have 20-40 years’ experience. Many years of experience in marketing would make them gather ideas that would be useful when challenges arise (Okoye *et al.*, 2010). Fifty two percent of the marketers sold *nitida* and *acuminata* specie of kolanut while 48% of them sold only *nitida* spp.

The mean age of farmers in Gbongan was 53years, married (84.6%), had secondary education (46.1%), membership of a social economic group (100%), had 26years of experience in kola marketing and sold two varieties of kola namely *nitida* and *acuminata*. On the other hand, the mean age of kolanut farmers in Shagamu was 52years old, married (83.4%), had primary education (41.7%), belonged to a social economic group (100%), had 28 years of experience and markets *nitida & acuminata* specie of kolanut. Adewumi, 2003 reported that the mean age of kolanut marketers in Ekiti state was 50 years, this is like the age of kolanut marketers in Gbongan and Shagamu.

Table 1: Socio economic characteristics of kolanut marketers in the selected markets in Nigeria

Variable	Gbongan		Shagamu		Both market	
	Freq.	%	Freq	%	Freq	%
Kolanut Markets						
Gbongan	104	100			104	52.0
Shagamu	96	100	96	100	96	48.0
Age						
≤30	0	0.0	8	8.3	8	4.0
31-60	72	69.2	64	66.7	136	68.0
>60	32	30.8	24	25.0	56	28.0
Mean	53.2 ± 10.8		51.6 ± 11.2		52.4 ± 11.0	
Marital status						
Single	0	0.0	8	8.3	8	4.0
Married	88	84.6	80	83.4	168	84.0
Widow/widower	16	15.4	8	8.3	24	12.0
Educational level						
No formal education	24	23.1	32	33.3	56	28.0
Primary	32	30.8	40	41.7	72	36.0
Secondary	48	46.1	24	25.0	72	36.0
Membership of social economic group						
Yes	104	100.0	96	100	200	100
Years of experience						
10-20	32	30.8	32	33.3	64	32.0
21-30	40	38.5	40	41.7	80	40.0
31-40	32	30.8	24	25.0	56	28.0
Mean	26.3 ± 9.4		27.7 ± 7.9		26.9 ± 9.3	
Type of Kola						
Nitida	48	46.2	40	41.7	88	44
Nitida and Acumilata	56	53.8	56	58.3	112	56

Source: Field Survey, 2022

Kolanut processing and storage in the selected markets

Kolanut processing and storage was presented in Table 2. Activities in kolanut processing include soaking, peeling, storage and transport. All the marketers are involved in all these processes as they are all important to be done to kolanut before it can be fit for sale and consumption. The raw materials needed for kolanut processing are raw kolanut (kolanut with skin), water, paper, leaves, Gamallin (tari) and Phostocin. All the

marketers need raw kolanuts before any processing can be done. Eighty eight percent of them need paper for processing, 64% use leaves while 56% and 88% of them use gamallin and phostocin chemicals respectively. Gamallin and Phostocin chemicals are dangerous to the body and thus there have been sensitization on the need for marketers not to use them. While carrying out this research, it was discovered that the marketers still use these chemicals.

Table 2: Kolanut processing and storage in selected markets in Nigeria

Variable	Freq.	%
Activities in kolanut processing operations		
Soaking	200	100
Peeling	200	100
Storage	200	100
Transport	200	100
Usage of raw materials in Kolanut Processing		
Raw Kolanuts (kolanuts with skin)	200	100
Water	128	64
Paper	176	88
Leaves	128	64
Gamallin (Tari)	112	56
Phostocin	176	88
Others	8	4

Source: Field Survey, 2022

Cost of operations in kolanut processing in the selected markets

The cost of operations in kolanut processing in the selected markets are presented in Table 3. The total cost and average cost incurred on soaking operation were ₦146,640 and ₦733.20 respectively. For kolanut peeling, the Total Cost (TC) and Average Total Cost (ATC) were ₦129,584 and ₦647.90

respectively. Also, for storage operation the TC and ATC incurred were ₦147,200 and ₦736 respectively while the TC and ATC for transportation were ₦211,664 and ₦1,058.30 respectively. The TC incurred on operations for kolanut processing was ₦635,088 and the ATC was ₦3,175.40.

Table 3: Cost of operations in kolanut processing in the selected markets

Operation	Total Cost (Naira)	Average Cost per marketer (Naira)
Soaking	146640	733.2
Peeling	129584	647.9
Storage	147200	736.0
Transportation	211664	1058.3
Total cost on processing	635088	3175.4

Source: Field Survey, 2022

Costs of materials used in kolanut processing

The costs of materials used in kolanut processing are presented in table 4. The TC and ATC expended on purchase of raw kolanuts were ₦7,025,624 and ₦35,128.10 respectively. For water the TC and ATC expended were ₦222,536 and ₦1,112.70 respectively. The TC and ATC expended on paper were ₦103,600 and ₦518. Also, for leaves the TC

and ATC expended on leaves were ₦169,600 and ₦848. The TC and ATC spent on Gamallin (tari) were ₦58400 and ₦292 while for Phostocin the costs were ₦89,640 and ₦448.20 for TC and ATC respectively. The other costs of materials incurred in kolanut processing were ₦16,000 and ₦80. The TC and ATC of materials used for kolanut processing are ₦7,685,400 and ₦38,427.

Table 4: Cost of materials used in kolanut processing in the two markets

Materials	Total Cost (Naira)	Average cost per marketer
Raw kolanuts (kolanuts with skin)	7025624	35128.1
Water	222536	1112.7
Paper	103600	518
Leaves	169600	848
Gamallin (Tari)	58400	292
Phostocin	89640	448.2
Others (specify)	16000	80
Total cost of materials	7685400	38427

Source: Field Survey, 2022

Profitability of Kolanut in the selected markets

$$\text{Total cost} = \text{₦635088} + \text{₦7685400}$$

$$= \text{₦8,320,488}$$

The average total costs (cost of operations and cost of materials) incurred on kolanut was ₦41,602.

$$\text{ATC} = 3175 + 38427$$

$$= 41602$$

The Average Total Revenue of kolanut in the two selected markets was ₦399,860

Average Total Revenue on sale of kolanut per marketer = ₦399860

The profit an average marketer in the two selected markets was ₦358,258

$$\text{Profit/ marketer} = 399860 - 41602$$

$$= \text{₦358258}$$

$$\text{Efficiency} = \text{Output/Input}$$

$$= 399860/41602$$

$$= 9.61$$

$$= 9.61$$

The efficiency of kolanut marketers in the selected markets was 9.61. This revealed that the output is 9.61 times more than the input. The kolanut marketing in the selected markets was efficient.

Cost of Operations in Gbongan and Shagamu markets

The cost of operations in kolanut processing in Gbongan and Shagamu market are presented in Table 5. The total cost and average cost incurred on soaking operation were ₦59,184 and ₦569 respectively in Gbongan while they were ₦87,456 and ₦911 in Shagamu. Marketers in Shagamu incurred more cost on soaking operation compared to Gbongan. For kolanut peeling in Gbongan, the TC and ATC were ₦54,784 and ₦526.80 while it was ₦74,800 and ₦779 in Shagamu. Marketers in Shagamu spent more than what marketers in Gbongan spent on peeling. Also, for storage operation the TC and ATC incurred were ₦34000 and ₦327 respectively in Gbongan while it

was ₦113200 and ₦1179 in Shagamu. For transportation cost the TC and ATC for transportation in Gbongan was ₦95,664 and ₦920 while it was ₦116,000 and ₦1,208 in Shagamu market. The TC incurred on operations for kolanut processing in Gbongan market was ₦ 243,632 and the ATC was ₦2343 while it was ₦391,456 and ₦4078 respectively, in Gbongan. Marketers in

Shagamu incurred more cost in all the operations compared to their counterparts in Gbongan. This may be because Shagamu market is close to Lagos State thus things may be expensive there as it is in Lagos. Gbongan is situated in Osun State a relatively smaller and less metropolitan compared to Lagos state thus life here is relatively cheaper compared to Ogun and Lagos States.

Table 5: Cost of operations in kolanut processing in the selected markets in Nigeria

Gbongan			Shagamu		
Operation	Total Cost (Naira)	Average Cost per marketer (Naira)	Total Cost (Naira)	Average Cost per marketer (Naira)	
Soaking	59184	569	87456	911	
Peeling	54784	526.8	74800	779	
Storage	34000	327	113200	1179	
Transportation	95664	920	116000	1208	
Total cost on processing	243632	2343	391456	4078	

Source: Field Survey, 2022

Cost of operations in kolanut processing in Gbongan and Shagamu markets

The costs of operations in kolanut processing in the selected markets are presented in table 3. The total cost and average cost incurred on soaking operation was ₦146,640 and ₦733.20. For kolanut peeling the total cost and average cost was ₦129,584 and ₦647.90. Also, for storage operation the total cost and average cost incurred were ₦147,200 and ₦736 while the total cost and average cost for transportation were ₦211,664 and ₦1058.30. The total cost incurred on operations for kolanut processing were ₦635,088 and the average cost was ₦3,175.40.

The costs of materials used in kolanut processing in Gbongan and Shagamu markets were presented in table 4. The TC and ATC expended on purchase of raw kolanuts in Gbongan were ₦4,261,024 and ₦40,971 while for Shagamu it was ₦2,764,600 and ₦28,798. For water the TC and

ATC expended in Gbongan was ₦114,920 and ₦1,105 while for Shagamu the TC was ₦107,616 and the ATC was ₦1,121. The TC and ATC expended on paper were ₦30,400 and ₦292 while for Shagamu the costs were ₦73,200 and ₦763. Also, for leaves the TC and ATC expended on leaves in Shagamu was ₦149,600 and ₦1,558 while for Gbongan the costs are ₦20,000 and ₦192. The TC and ATC spent on Gamallin (tari) in Shagamu were ₦148,600 and ₦154 and for Gbongan the costs were ₦43,600 and ₦419. For phostocin the costs in Gbongan were ₦535,000 and ₦337 while for shagamu the costs were ₦546,400 and ₦5,690. The TC and ATC of other materials used for kolanut processing in Gbongan were ₦4,520,944 and ₦43,471 while for Shagamu it was ₦3,164,456 & ₦31,974. The cost of materials in Gbongan is higher than that of Shagamu market. In the case of cost of operations, costs at Shagamu is higher than that of Gbongan. Reverse is the case for cost of materials.

Table 6: Cost of materials used in Kolanut processing in selected markets in Nigeria

Gbongan		Shagamu	
Materials	Total Cost (Naira)	Average cost per marketer	Average cost per marketer
Raw kolanuts (kolanuts with skin)	4261024	40971	2764600
Water	114920	1105	107616
Paper	30400	292	73200
Leaves	20000	192	149600
Gamallin (Tari)	43600	419	14800
Phostocin	35000	337	54640
Total cost of materials	4520944	43471	3164456

Source: Field Survey, 2022

Marketing efficiency of kolanut marketers in Gbongan and Shagamu Markets

Gbongan

Average Total Cost = 2343 + 43471

= 45813/25

= 1833

Average Total revenue on sale of kolanut per marketer/kg= 12478

$$\begin{aligned} \text{Profit per marketer} &= 12478 - 1833 \\ &= 10645 \end{aligned}$$

$$\begin{aligned} \text{Efficiency} &= \text{Output/Input} \\ &= 12478/1833 \\ &= 5.80 \end{aligned}$$

In Gbongan, a kolanut marketer produces six times of what was used as input. A marketer in Gbongan is efficient.

Shagamu

$$\begin{aligned} \text{Average Total Cost /kg} &= 4078 + 31974 \\ &= 36052 \\ &= 1442 \end{aligned}$$

$$\begin{aligned} \text{Average Total revenue on sale of kolanut per} \\ \text{marketer/ kg} &= 19803 \end{aligned}$$

$$\begin{aligned} \text{Profit per marketer/kg} &= 19803 - 1442 \\ &= 18361 \end{aligned}$$

$$\begin{aligned} \text{Efficiency} &= \text{output/input} \times 100 \\ &= 18361 / 1442 \\ &= 12.73 \end{aligned}$$

In Shagamu a kolanut marketer produces thirteen times of what was used as input. This means that the output is 12.73 times more than the input. A marketer in Shagamu market is efficient.

Determinants of marketing efficiency in Gbongan Market

Table 7 shows the result of the linear regression analysis of determinants of efficiency in Gbongan kolanut market. Linear regression was used because it has the highest R² compared to the other functional forms (double log, semi-log and exponential). The result shows that the regressors can explain 85.9% of the variations in the dependant variables, that is, the coefficient of determination (R²) was 85.9%. The coefficients for age, marital status, educational level, experience in kolanut marketing, type of kolanut and the price of kolanut per kg were all significant. An increase in the age of a marketer by 1 year would reduce the efficiency of kolanut marketing. An improvement in the marital status of a marketer would increase marketers' efficiency. This is in line with the socioeconomic characteristics where most of the marketers were married. Their spouses and children help with the business. The type of kolanut used also reduced efficiency while price increases efficiency even though the coefficient is very small.

Table 7: Determinants of Efficiency in Gbongan kolanut market

Variable	Coefficient	S.E	P> t
Age	-1.513***	0.1846	0.000
Marital status	17.0437***	1.2491	0.000
Educational Level	-7.009***	1.2327	0.000
Experience in kola marketing	-0.3483**	0.1556	0.028
Type of Kola	-17.6430***	2.8534	0.000
Price per kg	0.00003***	0.0023	0.000
Constant	106.1183***	17.5390	0.000
R	0.8598***		0.000

Source: Field Survey, 2022 ***, **, * 1%, 5% and 10% level of significance

Determinants of efficiency in kolanut market in Shagamu market

Table 8 presented the result of the regression analysis of determinants of efficiency in Shagamu kolanut market. The result shows that the regressors can explain 93.4% of the variations in the dependant variables, that is, the coefficient of determination (R²) was 93.4%. The coefficients for age, marital status, educational level, type of kolanut and the price of kolanut per kg were all significant. An increase in the age of a marketer by 1 year would

reduce the efficiency of kolanut marketing. An improvement in the marital status of a marketer would increase marketers' efficiency. This is in line with the socioeconomic characteristics where most of the marketers were married. Their spouses and children help with the business. The type of kolanut used also reduced efficiency while price increases efficiency even though the coefficient is very small Table 8: Determinants of Efficiency in Shagamu kolanut market.

Variable	Coefficient	S.E	P> t
Age	-1.8125***	0.2058	0.000
Marital Status	13.9089***	2.5171	0.000
Educational level	-10.8687***	3.7235	0.005
Experience in Kola Marketing	0.1547	0.2375	0.517
Type of Kolanut	-10.6798***	2.8317	0.000
Price per kg	0.0001***	0.0004	0.000
Constant	87.0764***	20.8480	0.000
R	0.9344***		0.000

Source: Field Survey, 2022 ***, **, * 1%, 5% and 10% level of significance

CONCLUSION

Kolanut marketers in selected markets in Nigeria are efficient. Marketers in Shagamu are more efficient than marketers in Gbongan. The lowness in the marketing efficiency at Gbongan market might be due to the fact that more average cost of materials, which was N43,471 was incurred in Gbongan compared to that of Shagamu which was N31,974. Hence, increase in average cost of materials reduced the efficiency of Gbongan market. Apart from this, the mean age of kolanut marketers at Shagamu market was relatively lower than that of Gbongan market, and the lower the age of the kolanut marketers, the higher the efficiency. In the two markets, marketers were using chemicals (gamallin and phostocin) to preserve kolanuts and these chemicals are harmful to the people that consume kolanut and this could also reduce the marketing efficiency in the selected markets. This is because some kolanut consumers will be skeptical about the kolanut consumption because of the chemicals used to preserve it and this could reduce the marketing efficiency. However, in order to avert the problems that may result from chemical preservation, some kolanut marketers were using local materials such as lime, leaves and nylon to preserve their produce. The determinants of marketing efficiency in the selected markets are age, educational level, marital status, type of kola and price of kolanut. The study however recommended that local botanicals should be developed in place of chemicals to preserve kolanuts. Also, kolanut market infrastructures should be properly developed to enhance higher efficiency.

REFERENCES

- Adewumi, O.R. (2003). Marketing of Kolanut in Moba Local Government of Ekiti State, Nigeria. Agric Economics and Farm Management. Abeokuta: Federal University of Agriculture; 2003.
- Ajani, E.N and Onwubuya, E.A (2012): Marketing infrastructure for kola-nut in Ika Local Government Area of Delta State, *Nigeria Journal of Emerging Trends in Computing and Information Science* 3(5): 694-698.
- Ajewole, T.O. Elehinafe, F.B.Okedere, O.B and Shomefun, T (2021): Agro-residues for clean electricity: A thermo-property characterization of cocoa and kola-nut waste blends. *Heliyon*7(9):1-9.
- Albert, C.O, Ladu, T., Isife, B.I (2017). Assessment of women involvement in cassava processing in Ikwerre local government area of rivers state, Nigeria. *Int J Appl Res Technol* 6:44-51.
- Asogwa, E.U.; Otuonye, A.H.; Mokwunye, F.C.; Oluyole, K.A., Ndubuaku, T.C.N. and Uwagboe, E.O. (2011). Kolanut Production, Processing and Marketing in the South-Eastern States of Nigeria. *African Journal of Plant Science*. 5(10): 547-555.
- Asogwa EU, Anikwe JC, Mokwunye FC (2006). Kola production and utilisation for economic. *Development Afr. Sci.* 7(4): 217-222
- Chinweike, A.U., Alli, A.M., Adesanya, K.A., Agboola- Adedoja, M.O., Adelusi, A.A., Ogunwolu, Q.A. and Akinpelu, A.O. (2020). Health implications of kola-nut production and consumption. *World Journal of Advanced Research and Reviews* 8(03): 312-316.
- Esiobu, N.S, Nwosu, C.S, Onubuog, G.C (2014). Economics of pineapple marketing in Owerri Municipal Council Area, Imo state, Nigeria. *Int J Appl Res Technol* 3:3-12.
- Famaye, A. O. (2012). A handbook on Kola Production. Cocoa Research Institute of Nigeria (CRIN), Ibadan, Nigeria.
- Kanu, I. A. (2020). The Igbo African Kolanut as a Symbolic Manifestation of Igwebuikwe philosophy. *Amamihe Journal of Applied Philosophy*, 6(1):31-46.
- Kim, K and Frey R. J. (2005): Kola-nut. In: Longe JL, editor. *Gale encyclopedia of alternative Med.*: Farmington Hills: Thomson Gale; 2005. pp. 1164-1167.
- Ndagi I., Babalola F. D., Mokwunye I. U, Anagbogu C. F, Aderolu I. A, Ugioro O, Asogwa, E. U, Idrius M, and Mokwunye F. C. (2012): Potentials and Challenges of Kola-nut Production in Niger State, Nigeria. *International Scholarly Research Network Agronomy* (10): 1-9.
- Nwaru J. C., Nwosu, A. C., Agommuo, V. C. (2011). Socioeconomic determinant of profit in wholesale and retail banana marketing in Umuahia agricultural zone of Abia state, Nigeria. *J Sustain Dev Afr* 13:200-209.
- Nwawuisi, J. U., Okoye, B. C., Odaji, C. O. (2007). Adoption of Improved Cassava Varieties (TMS 30211 and TMS 3001) in Ivo L.G.A of Ebonyi State. Samaru: Paper Presented at the Proceedings of the 41st Conference of the Agricultural Society of Nigeria; 2007. p. 527-30.
- Okoye, B. C., Onyenweaku, C. E., Ukoha, O. O. (2010). Effect of Transaction Costs on Seller Decisions Among Small-holder Cassava Production in South-Eastern, Nigeria: Paper Presented at the 11th Annual National Conference of Natural Association of Agricultural Economist Held at Federal University of Technology (FUT). Minna, Nigeria: University of Technology pp. 183-187

- Oluyole, K. A., Adebisi, S. and Fagbami, O. O. (2009). Economic Journal Analysis of Kolanut Production in Osun State, Nigeria. *International of Sustainable Crop Production*. 4(3): 12-15.
- Opeke, L. K. (1992): Tropical tree crops. Spectrum Books Ltd., Ibadan, pp 180–200
- Uguru, M. I. (2011): Crop production; Tools, Techniques and practices.2011; 130.
- Ugwu, C. A., Alli, M. A., Adesanya, K. A., Oluwaseyi, M., Agboola, Adedoja, A. A. A., Ogunwolu, Q. A. and Akinpelu, A. O. (2020). Health implications of kolanut production and consumption. *World Journal of Advanced Research and Reviews*: 8(3): 312–316.