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FACTORS DETERMINING VALUE ADDITION TO CASSAVA IN EBONYI NORTH AGRICULTURAL ZONE OF EBONYI STATE, NIGERIA

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ABSTRACT

This study investigated the factors determining value addition to cassava in Ebonyi North Agricultural Zone of Ebonyi State, Nigeria. Findings revealed that 96.3% of the respondents did not have access to business credits with 44% having their main source of income from personal savings. These situations posed a serious constraint to majority of the cassava processors who are unable to use modern processing equipment or pay for the processing charges. The major value-added to cassava in the study area were garri (51.9%), fufu (24.1%), tapioca (20.4%), and starch (3.7%). Factors such as farming experience (P<0.01), marital status (P<0.01) and educational level (P<0.01) positively influenced value addition to cassava in the study area. It is recommended that cassava processors should organize themselves into cooperatives to enable them mobilize adequate funds and enjoy economies of *scale.*

Keywords: Cassava, Processors, Value Addition, Factors, Determinants, Technologies.

INTRODUCTION

Cassava crop has continued to gain prominence among farmers while the industrial demand is consistently rising. For instance, Nigeria alone produced about 42.5 million metric tons which constitutes about 18% of total global production. In addition, Nigeria's share of world production had risen to 21.5% of World production by 2018 (FAO, 2018). Aside from its use as human food, it can be used for the production of flour for confectioneries, formulation of animal feeds and the production of industrial starch and alcohol. Cassava is also considered as the most productive crop; a source of food energy in the tropic as well as plays a food security role in Africa where annual production feeds over 80 million people (Esheya, 2021). F.A.O (2018) as cited by Technical Centre for Agricultural and Rural Cooperation (CTA, 2001) predicted that from 1996 to 2050, cassava production had to rise by more than 700% in the 21st centuries in West Africa, Central and East Africa if food sufficiency is to be achieved.

When cassava is processed, value is added to the produce (James, 2012).This value addition provides both rural and urban areas with affordable, quality food and raw materials for the industry (Adrin, 2008). According to IFAD-FAO (2005), the concept of value addition is defined as the full range of activi-

ties which are required to bring a product or service from conception through intermediary phases of production (involving a combination of a physical transformation and the input of various producers' services), delivery to final consumers and final disposal after use. Unfortunately, there has been a reduction in cassava production in the country leading to its scarcity and high market price. This might probably be attributed to the highly perishable nature of cassava products which makes most rural farmers not to get the desired reward for their work as the majority of their produce are lost a day or two after harvest (Esheya, 2022).

A good number of food is lost in post-harvest and access to credit, particularly by root crop farmers is a major challenge (James, 2012). This has resulted in smallholder cassava producers having weak and limited access to markets. The high transportation costs and the need to process cassava within 48 hours of harvesting because of its perishability, make small producers sell most of their products at local markets even at a very reduced price. The high fragmentation of farms with rudimentary technologies, small-scale cultivation characterized by a low level of mechanization and poor infrastructure even make it more difficult to develop commercial-scale aggregation coupled with poor roads; inadequate storage facilities; drive up prices and increase post-harvest losses.

Ebonyi State is one of the states in South-East, Nigeria that has invested much in cassava production, especially in value addition. Some of the value-added products of cassava are garri, fufu, tapioca, ethanol, starch, cassava flour, cassava chips, glucose syrup, livestock feed. The inhabitants, especially the rural dwellers, depend on cassava as a means of income generation for their livelihood. Several authors have carried out empirical studies on value addition: Nneoyi, *et al., (*2018); Mendelsohn, et al, (2000); and Sajeev *et al.,* (2002) in their study of Kinetics of gravity settling of cassava starch in its aqueous suspension found out that prices were not favourable to cassava growers. The cassava tuber prices were not favourable during January and June in the year 2002 while it was favourable between July and December. There were fluctuations in the prices of cassava and its products during different quarters in the year 2002. Prices of starch, sago and market forces were influencing the price determination process for cassava tubers. Agbetoye (2013) examined the processing of cassava into garri in Oyo State, Nigeria. In the study, cost and returns analysis revealed that garri processing is profitable and lucrative, with a gross margin of ₦7, 360.00 per bag (50kg). Profit was regressed against socio-oeconomic factors and results showed that age, marital status, level of education and years of experience have positive effects on the level of profit made by processors. Conversely, gender and family size have inverse relationships. The study showed that inadequate raw material supply, lack of credit facility, poor road networks and lack of availability of labour were the constraints to processing of cassava into garri in the State. Morton (2017) argues that besides local demand, there is a high demand for cassava-based products in foreign countries, such as an urgent demand for 400,000 tonnes of cassava chips (about 1.6 million tonnes of CRT) for animal feeds in South Africa and Botswana.

Significant post-harvest losses of cassava roots occur in many parts of Nigeria, as a result of the root's inherent high moisture content, which accelerates microbial deterio-

ration and unpredictable biochemical changes (Onyenwoke & Simonyan, 2014). Additionally, cassava fresh roots are very bulky to transport, extremely perishable and for some varieties, contain poisonous cyanogenic compounds (Enete, et al, 2004). Hence, bulkiness and high perishability of harvested roots make immediate processing of the roots necessary. (Nweke, 1994; Iwuoha *et. al*., 2013).

Despite the capacity of cassava in providing financial and food security (Kolawole, *et. al,* 2010), its production and processing is massively challenged by multitudes of factors. Neglect of agricultural activities has been a very serious problem which affects both producers and marketers of agricultural produce in the country. This situation appears to be aggravated by the government and policymakers who have not considered production and processing. Nigeria has great potential to greatly enhance the productivity of cassava. Application of value addition to cassava will enhance the product; the basis for value addition is a necessity for enhancing the productivity of cassava production and processing. Against this background, this study was conducted to examine the factors determining value addition to cassava in Ebonyi agricultural zone of Ebonyi State, Nigeria.

METHODOLOGY

Study Area

The study was carried out in Ebonyi North agricultural zone,Ebonyi state, Nigeria. The study area comprises of Abakaliki, Ebonyi, Izzi, and Ohaukwu local government areas. Ebonyi State which is located in South East region of Nigeria is divided into three agricultural zones namely: Ebonyi North, Ebonyi Central and Ebonyi South Agricultural Zones. Ebonyi North Agricultural Zone consists of four Local Government Areas, which are Abakaliki, Ebonyi, Izzi and Ohaukwu Local Government Areas. The state lies in the humid tropical agro-ecological zone of Nigeria within Longitudes 70 30'E and 80 30'E and Latitudes 50 40'N and 60 45'N. It has a land area of 5,935 km2 with a projected population of 2,253,140 persons. The State shares boundaries on the North by Benue State, to the West by Enugu State, to the East by Cross River State and to the South by Imo and Abia State. The climate of Ebonyi State is that of a humid tropical climatic region. The mean annual temperature stands at 280C with an average rainfall of 1200mm - 2500mm (NPC, 2006). Some of the common food crops grown in the area are cassava, yam, rice, water yam, cocoyam, maize, groundnut, banana and vegetables. Economic activities of the inhabitants are farming, trading, fishing, crafts, hunting, transportation, artisans and civil service (Ebonyi ADP, 2017).

Sampling procedures and sample Size

Multi-stage sampling technique was used for this study. In stage one, three Local Government Areas namely Abakaliki, Izzi and Ohaukwu were purposively chosen out of the existing four Local Government Areas because of the greater concentration of cassava farmers in the areas. Stage two involved random selection of three autonomous communities out of the numerous communities in the selected Local Government Areas. In stage three, four villages were randomly selected from each of the three selected autonomous communities, giving a total of 36 villages for the study. Lastly, three cassava farmers were randomly selected from each of the four villages to obtain a sample size of 108 respondents for the study.

Analytical techniques

Both descriptive and inferential statistics were used for analysis of data. Frequency count and percentage were used to analyse objectives one and two which are the socio-economic characteristics of cassava farmers in the study area, the extent of value addition to cassava and the type of technologies used by the processors in the study area. Regression (Poisson) model was used to assess the factors that affect value addition to cassava value chain. The model is explicitly stated as:

$VAD=Q_o+Q_1Age+Q_2Gen+Q_3Edu+Q_4FI+Q_5N-FI+Q_6NGO+Q_7CP+Q_8Ext+Q_9COC+Q_{10}CA+Q_{11}H$ HS

VAD= Value addition (₦)

AGE= Number of years

GEN= Gender (Dummy, Male = 1, Female = 0)

EDU= Number of years of formal education (years)

FI = Annual Farm Income (₦)

NFI = Non-farm income (₦)

NGO = Contact with farm cooperative organization (Dummy, contacted=1, otherwise = 0)

CP= Cost of processing per batch (₦)

EXT = Extension contact (Dummy, contacted =1, otherwise =0)

COC= Cost of Cassava tubers per kg (₦)

CRE = Credit accessibility (Dummy, Access to credit =1)

HHS = Household Size (Number)

MS = Marital Status (Dummy, married =1, otherwise =0).

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

Majority (59.3%) of the processors were females while 40.7% were males (Table 1). This is an indication that they are more female cassava processors than male processors in the study area. This could also imply that decision making on issues of ensuring value addition to cassava processing is mostly done by females than male respondents in the study area. The result also showed that 63.9%of the respondents fell between the ages of 31 and 50 years with a mean age of 36 years. This implies that majority of respondents are still within a productive and active working-age range that can participate actively in cassava processing and related activities. This finding concurred with the findings of Windapo (2001) who reported that productive and active persons participate more in agricultural and community development activities such as production and processing of farm produce. Marital status showed that there were more married respondents (74.1%) than single (20.4%), widows (4.6%) and divorced respondents (0.9). The reason for this high percentage of married couples in the study may probably be attributed to the fact that marriage thrusts responsibilities on the family which compels them into agriculture or farming. Adeogun, et al (2010) opined that marital status, age and education are the factors influencing the information and adoption of cocoa farmers on cassava processing techniques in selected states of Nigeria.

Household sizes showed that majority (47.2%) of the respondents had households of between 6 and 10 persons; (32.4%) had households of 11 persons and above while (20.4%) had households of 1 and 5 persons, with the mean household size of 8 persons (Table 1). This is an indication that the respondents may not need to involve hired labour for meaningful agricultural development since the labour can be effectively sourced from family members. It was found that (18.5%) of the cassava farmers who pro-

cessed cassava products had between 1and 10 years of experience with mean processing experience of 9 years (Table 1). 9.3% of the farmers had 11 – 20 years of processing experience. However, a good number of the respondents (72.2%) refused to give information on their years of cassava processing experience. Processing experience is used as a measure of management ability. The more experience the respondent has, the more his or her ability to make productive decisions. This showed that 9.3% of the respondents who take part in processing had long years of processing experience, implying that such processors were likely to make decisions that would increase their output and income. This finding was in tandem with the findings of Abah, et al, (2021).

Again, 96.3% of the respondents in the study area do not have access to business credit and only 3.7% of the respondents had access to business credit (Table 1). This implies that most of the processors in the study area do not access business credit. This may probably be attributed to the stringent measures associated with collateral in obtaining credit from the financial institutions. Main sources of finance available to the crop farm produce processors in the study area were personal savings (44.4%), friends or relatives (26.9%), associates (25.9%) and bank loan (2.8%) Table 1. The implication is that the major sources of finance among the respondents were personal savings, friends or relatives and associates, which are non-institutional credit sources. Credit from non-institutional sources was more attractive because there is little or no insistence on collateral security. On the other hand, formal sources of finance had low patronage from the farm produce processors, which may be due to lack or limited presence of banks in the study area coupled with delay in approval and disbursement of loan, high interest rate and insistence on provision of collateral security. These factors had negative influence on the adoption of new cassava processing technologies thereby retarding the growth of cassava processing industry in the study area.

Table 1: Socio-Economic Characteristics of Respondents

Characteristics	**Respondents**	
Gender (number)	**Frequency**	**Percentage (%)**
Male	44	40.7
Female	64	59.3
Total	**108**	**100**
Age Distribution (years)		
20-30	16	14.8
31-40	29	26.9
41-50	40	37.0
51 years & above	23	21.3
Total	**108**	**100**
Mean	**36 years**	

Marital status (number)		
Single	22	20.4
Married	80	74.1
Divorced	1	0.9
Widowed	5	4.6
Total	**108**	**100**
Educational qualifications (years)		
Non-formal Education	6	5.6
Primary	32	29.6
Secondary	22	20.4
Tertiary	48	44.4
Total	**108**	**100**
Household size		
1-5 persons	22	20.4
6-10 persons	51	47.2
11 persons and above	35	32.4
Total	**108**	**100**
Mean		
Years as Cassava Processor		
No Response	78	72.2
1-10	20	18.5
11-20	10	9.3
21-30	0	0
31 years and above	0	0
Total	**108**	**100**
Mean	**9**	
Access to Credit		
Yes		
No		
Total	4	3.7
Sources of Finance	104	96.3
Bank Loan	**108**	**100**
Personal Savings		
Associates	3	2.8
Friends and Relatives	48	44.4
Total	28 25.9	
Income	29	26.9
Less than ₦10,000	**108**	**100**
₦10,000 - ₦100,000		
₦101,000 - ₦200,000	3	2.8
₦201,000 - ₦300,000	95	88
Above ₦300,000	5	4.6
Total	4	3.7
Mean Income = ₦66,153	1	0.9
	108	**100**

Source: Field Survey, 2019.

Distribution of respondents based on extent of cassava usage

Majority (78.7%) of the respondents reported that they process all the roots of cassava harvested; 12.0% of the respondents' process some and sell some of the roots while only 5.6% usually sell all the cassava roots upon harvest (Table 2). Only 3.7% of the respondents used the cassava roots harvested at home for consumption. This is an indication that respondents in the study area are more interested in getting value for their money by transforming the cassava roots into other forms to get income and other satisfying benefits through produce processing and value addition.

Table 2: Uses of Harvested Cassava Roots

Uses of Harvested Cassava Tubers	Frequency	Percentage
For home use only	4	3.7
I sell all	6	5.6
I process all	85	78.7
I process some and sell some	13	12.0
Total	**108**	**100.0**

Source: Field Survey, 2019.

Distribution of respondents by cassava processing technologies

Technologies utilized by the respondents in the study area to process cassava roots to include mechanical grating and hydraulic pressing (51.9%), fermentation tank (13.9%), hydraulic pressing (9.3%), hand grating and wood pressing (8.3%) Table 3. This indicated that most of the respondents deployed improved technologies to process their cassava. Respondents that could not use modern techniques for cassava processing may have been constrained by limited funds to acquire modern processing equipment or pay for the processing. This confirmed Esheya (2019) assertion that capital was one of the factors affecting the acceptance of innovation by farmers in Nigeria. This is in agreement with Jimson (2009) who stated that lack of funds and poor information hindered the awareness of the respondents on how to improve cassava processing by rural farmers.

Table 3: Types of Cassava Processing Technologies

Processing Technology	Frequency	Percentage
Traditional Technologies		
Hand grating	0	0
Stone pressing	1	0.9
Fermentation tank	15	13.9
Wood pressing	7	6.5
Hand grating and stone pressing	4	3.7
Hand grating and wood pressing	9	8.3
Improved Technologies		
Hammer mill	0	0
Mechanical grating	6	5.6
Hydraulic pressing	10	9.3
Mechanical grating and hydraulic pressing	56	51.9
Total	**108**	**100.0**

Source: Field Survey, 2019.

Distribution of respondents based on products of value addition

The major value-added products produced include: garri (51.9%), fufu (24.1%), tapioca (20.4%) and starch (3.7%) Table 4. This finding is in line with that of Falola, et al (2016).

Table 4: Products of Value Addition on Cassava Roots

Products of Value Addition	Frequency	Percentage
Garri	56	51.9
Fufu	26	24.1
Tapioca	22	20.4
Starch	4	3.7
Total	**108**	**100.0**

Source: Field Survey, 2019.

Factors determining value addition to cassava

The practice of cassava value addition was significantly influenced by farming experience, marital status, education and credit access (Table 5). The coefficient of processing experience was positive and statistically significant ($P < 0.01$). This implies that highly experienced cassava processors added value to their cassava. The marginal effect indicates that a year increase in processing experience will increase the probability of the processors adding value to their cassava product by 4%. The coefficient of marital status was positive and highly significantly related to the probability of a processor adding value to cassava. A unit increase in the number of married couples will increase the odds of a processor adding value by 14.4 times (Table 5). This means that married couples added value to cassava than singles in the area. Education helps processors to adjust more rapidly to the new opportunities provided by technical innovations. Educated processors are first movers, adding value to cassava products, hence making them more profitable and attractive. Education is a key factor in value addition because it has been found to influence other factors such as management skills, household income and access to capital which would all have a positive effect on value addition (Keimers andKlanses, 2011).

The coefficient of education was found to be positive and statistically significant ($P < 0.01$). A year increase in the years of formal education will increase the probability of the processor adding value to cassava by 6%. These findings imply that highly educated processors will be exposed to new ideas and other opportunities available to improve their farm produce processing and management skills. Credit access which would have played a crucial role in eliminating processors' financial constraint in adding value to agricultural produce is not statistically significant. According to Ubokudom, et al (2021), credit access aid in increasing productivity as well as improving technologies by buying new value-added equipment. This finding was not in line with that of Amusa, et al (2017), who noted that access to credit is important for improving the quality and quantity of farm products so that it can improve farmer's income and avoid rural migration.

Table 5: Poisson Model of Factors Determining Value Addition to Cassava

Variables	Coefficient	Std. Error	z-value	P-value	Marginal Effect
Const.	-0.9438	0.25673	-3.68	0.000	
Gender	-0.1304	0.0972	-1.34	0.179	-0.2461
Age	0.0030	0.0038	0.79	0.431	0.0055
Processing experience	0.0255	0.0090	2.83	0.005***	0.0467
Marital Status	0.8138	0.0726	11.22	0.000***	1.4427
Education	0.0365	0.0103	3.55	0.000***	0.0670
Credit access	0.0250	0.0771	0.32	0.745**	0.0461
Cooperative membership	0.1182	0.8495	1.39	0.164	0.2071
Extension access	-0.0532	0.0592	-0.90	0.369	-0.0965
Cost of cassava	0.0000	0.0000	1.02	0.305	0.0001
Household size	0.0116	0.0081	1.45	0.148	0.0214
Pseudo R^2	0.1703				
Chi^2 (10)	772.79 (0.0000) ***				

Source: Computed from Field Survey, 2019.

CONCLUSION

This study examined the factors determining value addition to cassava in Ebonyi North Agricultural Zone of Ebonyi State, Nigeria. The study revealed that the cassava processors' efforts and decision to add value to cassava paid off. Value addition to cassava is largely influenced by factors such as processing experience, marital status and level of education. Credit which is a key factor in reducing processors' financial constraints in adding value to farm produce is not statistically significant. Value addition to cassava has the potential to achieve food security and boost the economic fortunes of cassava processors through provision of regular income.

RECOMMENDATIONS

Farm produce processors should be supported financially, considering the relatively low rate of utilization of processing technologies in the study area.

Information on the adoption of improved technologies for cassava processing should be intensified to reduce spoilage and waste of cassava product. This will help increase the utilization of technologies as well as popularize value addition to cassava in the study area.

REFERENCES

Abah, D., Esheya, S.E, Ochoche, C.O. 2021. Effect of Maize Production on Agricultural Output in Nigeria 1981-2019. Implication for Sustainable Development. *International Journal of Agricultural Economics, Management and Development (IJAEMD),* 9(1); 42 – 54.

Adeogun, S. O., Olawoye, J. E., Akinbili, E. 2010. Information sources of cocoa farm-

ers on cocoa rehabilitation techniques in selected states of Nigeria. *Journal of Media and Communication Studies*, 2(1), 9-15.

Adrin, M. O. 2008. Evaluation of the effect of agricultural extension delivery on cassava production in Nigeria. A case study of Cross-River state of Nigeria. *The Nigerian Agricultural Journal,* 5 (2), 16-21.

Agbamu, J. J. 1996. Analysis of farmer's characteristics associated with the adoption of soil management innovations in Ikorodu local government area of Lagos state. *Nigerian Journal of Rural Extension and Development,* 1 (2), 57-67.

Agbetoye, L.A. 2013. Engineering Challenges in Developing Indigenous Machinery for Cassava Production and Processing. In *Proceedings of the Annual Conference of the Nigerian Society of Engineers* Ibadan, Nigeria, 8–12 December 2003; pp. 80-86.

Amusa, T. A., Anugwo, S. C., Esheya, S. E. 2017. Factors influencing processors' willingness to engage in mechanized palm fruits processing in Abia state, Nigeria. *The Nigeria Agricultural Journal*, 48 (2): 236-247.

EBADEP 2017. Ebonyi State Agricultural Development Programme. Annual bulletin 2017.

Enete, A.A., F.I. Nweke and Tollens, E. 2004. "Gender and Cassava Processing in Africa". *Quarterly Journal of International Agriculture,* 43 (1): 57 – 69.

Esheya, S.E. 2022. Allocative efficiency of tropical manihot selection cassava production in Ebonyi state, Nigeria. *Nigerian Agricultural Journal*, 53 (1): 35-39.

Esheya, S.E. 2021. Cost and Benefit Analysis of Cassava Production in Ivo Local Government Area of Ebonyi State, Nigeria. *International Journal of Agricultural and Rural Development,* 24 (1): 5546 – 5550.

Esheya, S.E. 2019. Economics of cassava production in Ohaukwu local government area of Ebonyi state, Nigeria. *AKSU Journal of Agricultural Economics, Extension and Rural Development,* 2 (2): 92 – 98.

Falola, A., Oyinbo, O., Adebayo S. A.,Jonathan, A., Jimoh, O. 2016. Determinants of value addition to cassava in Kwara state, Nigeria. *University of Mauritius Research Journal,* 22, 245-259.

Food and Agricultural Organization, [FAO]. 2018. Quality declared planting material: standards and protocols for vegetatively planting material. Rome, 223-247.

IFAD-FAO. 2005. A Review of Cassava in Africa with Country Case Studies on Nigeria, Ghana, the United Republic of Tanzania, Uganda and Benin. *Proceedings of the Validation Forum on the Global Cassava Development Strategy*. Vol. 2. FAO, Rome.

Iwuoha, G. N., Ubeng, G. G., Onwuachu, U.I. 2013. Detoxifcation effect of fermentation on cyanide content of cassava tuber. *Journal of Applied Science and Environmental Management, 17(4), 567–570.*

James, F. U. 2012. Analysis of participating and non-participating Commercial Agriculture Development Project (CADP) farmers in pineapple production in Awgu LGA, Enugu state, Nigeria*, Global Advanced Research Journal of Agricultural Science*.3(8), 259-270.

Jimson, O. D. 2009. "Effect of indigenous cassava processing techniques by rural women on the environment in Ondo state". An unpublished M.Tech Project submitted to the Department of Agricultural Economics and Extension, Federal University of Technology Akure, Ondo state, 33-40.

Keimers, M., Klanses, S. 2011. Revisiting the role of education for agricultural productivity. IAI discussion papers, No 214, Georg-August-Universitat Gottingen, Ibero-America Institute for Economic Research (IAI) Gottingen.

Kolawole, P. O., Agbetoye, L. A., Ogunlowo, S. A. 2010. Sustaining World Food Security with Improved Cassava Processing Technology: The Nigeria Experience. *Sustainability*, (*2)*: 3681-3694.

Mendelsohn, R., A. Dinar., A. Dalfelt 2000. Climate change impacts on African agriculture. Preliminary analysis prepared for the World Bank, Washington, District of Columbia, pp 25.

Morton, J. F. 2017. The Impact of Climate Change on Smallholders and Subsistence Agriculture. *PNAS, 104 (50).*

National Population Commission (NPC) 2006. The 2006 population census official gazette (extraordinary), 24(94), National Population Commission Report.

Nneoyi, I.O., Henry, M.N. Walter, A.M., Ebingha, E.E. 2018. Group Dynamics and Technology Use among Female Cassava Farmers in Akpabuyo Local Government Area, Cross River State, Nigeria. *Agricultural Journal.* 3 (4): 292-298.

Nweke, F. I. 1994. Processing Potentials for Cassava Production Growth in Sub-Saharan African. COSCA Working Paper, No. 11, IITA Ibadan, Nigeria.

Nweke, F. I., Enete, A. A. 1999, 'Gender surprises in food production, processing and marketing with an emphasis on cassava in Africa', COSCA Working Paper No. 19, COSCA, IITA, Ibadan, 53.

Ubokudom, E. O., Esheya, S. E., Udioko G. U. 2021. Profitability of Biofortified Yellow Cassava Farming in Nigeria: Empirical Evidence from Akwa Ibom State. *AKSU Journal of Agriculture and Food Sciences. Faculty of Agriculture, AKSU,* 5 (2): 100-112.

Onyenwoke, C.A., Simonyan, K.J. 2014. Cassava post-harvest processing and storage in Nigeria: a review. *African Journal of Agricultural Resources, 9(53), 3853–3863.*

Sajeev, M. S. Kailappan., R. Sreenarayanan, V. V., 2002. "*Kinetics of gravity settling of cassava starch in its aqueous suspension"*, Biosystems Engineering, 83, 327-337.

Technical Centre for Agricultural and Rural Cooperation (CTA, 2001). The trend in Cassava Production. Spore 93, CTA Wageningen, The Netherlands. https://cgspace.cgiar.org/handle/10568/46185.

Windapo, O. E. 2001. Multidimensional poverty: Conceptual and measurement issues. In: Kakwani, N., Silber, J. (Eds.). *The many dimensions of poverty*. Palgrave Macmillan, New York, 3(4), 45-48.

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