VALUE ADDITION AND PROFITABILITY OF LOCAL RICE PROCESSING IN OBAFEMI-OWODE LOCAL GOVERNMENT AREA, OGUN STATE, NIGERIA

OYEBANJO OLUMAYOWA
Department of Agricultural Economics and Farm Management, Olabisi Onabanjo
University, Ayetoro Campus, Ogun State, Nigeria
Email: oyebanjo.olumayowa@oouagoiwoye.edu.ng

Abstract

Rice processing is constrained by lack of modern equipment, low value addition and post-harvest losses. This study examined the profitability of value addition in traditional rice processing. A sample of 120 rice processors were randomly selected using structured questionnaire. The data were analysed using descriptive statistics, budgetary technique and Cobb-Douglas production model. The results show that 80.8% of the respondents was <50 years-old, male (89.2%), married (77.5%) while 46.7% had no formal education. The average rice processing experience was 15 years; mean household size was 5 persons while 51.2% did not participate in cooperative. The total cost constituted paddy (46.7%), value addition operations (16.8%) and labour (15.1%). The gross margin was ₦315,261.26 with profitability index of 0.56. Major constraints include poor processing/ storage facilities (80.0%), high cost/ scarcity of paddy (75.0%) and output price fluctuation (68.3%). Age of processors (0.146) and sex (0.762) significantly enhanced profitability while experience (-0.100), low formal education (-0.201) and manual labour (-0.056) reduced profitability level. Therefore, the rice processors should be educated through extension services about processing of quality and competitive or polished rice. Modern equipment should be provided to reduce manual labour and increased quantity of locally processed rice.

Key Words: *Paddy rice, Value addition, Profitability, Determinants, Constraints*

Introduction

Rice (*Oryza sativa, L*) is the staple food with highest demand in Nigeria (Gyimah-Brempong *et al*., 2016). In spite of this fact, there is a wide gap between domestic production of rice and demand leading to massive importation of milled rice (Johnson *et al.,* 2013). The quantity of local rice production in Nigeria was very low at 4.8 million tons while the local capacity for rice processing is 2.8 million tons of paddy (FAO, 2016). The low productivity in rice farming had been attributed to the use of crude tools and equipment which do not support large-scale production (Ogunsumi, *et al.,* 2013). Fasoyiro and Taiwo (2012) noted that the small-scale production is characterized by low output as a result of inefficiency, aging, lack of modern technology and drudgery of labour. Nneka *et al., (*2019) reported that the annual national demand

for rice was 5 million tons while the annual production stood at only 3.78 million tons in 2019. The demand for rice in Nigeria has been soaring speedily at an estimated rate of 10% per annum due to population growth, increased levels of income and urbanization (USDA, 2018). An average Nigerian consumes 24.8 kg of rice per year representing 9% of the total calorie intake (FAO, 2017). Laroche and Postelle (2013) have warned that long-term food security must be built on the development of domestic production with enough barrier protection against world price fluctuation and unfair trading. WARDA (2015) also warned that there is an urgent need to increase the production and marketing of quality rice in Nigeria.

Therefore, all tiers of government, non-governmental agencies, policy makers, researchers and other stakeholders in the rice industry have been making strategic efforts to increase rice production in Nigeria. The Federal Government imposed a ban on the importation of rice while providing facilities for local production in order to reduce the huge importation bill (Odumade, 2018). However, rice has been identified as one of the six major cash crops produced in Ogun State. There are opportunities for value chain in rice production in this State, which can lead to job creation and enhanced households' income. Meanwhile, Ibitoye *et al.* (2014) revealed that rice processing still depends on manual methods and many farmers sell their paddy unprocessed resulting to low farm gate price. The constraints in rice production were identified to include lack of value addition, limited access to modern processing assets; inadequate extension training and post-harvest losses.

In view of the problems stated above, the broad objective of this study was to examine the profitability of value addition in traditional rice processing in the Obafemi-Owode Local Government Area (LGA). The LGA is generally regarded as the land of Ofada rice (OS6) variety which was developed and named after Ofada town while another rice variety 'WAB189' locally known as 'Egbeda Olubori' was developed and named after a community called Egbeda both within the LGA (OGADEP, 1991; Oyebanjo *et al*, 2006). Specifically, Ofada rice has been predominantly grown in the area since 1940s among other arable crops (Gyimah-Brempong *et al.*, 2016).

Therefore, the findings would provide relevant information about value addition, method of processing, expected cost outlay and returns. It would promote job creation among the rice processors as well as enhance the formulation of appropriate policy towards increased and sustainable rice production and processing in the area. The specific objectives of the study were to describe the socioeconomic characteristic of the rice processors, estimate the cost and returns of value addition in rice processing, analyse the factors affecting profitability among the local rice processors and identify the constraints militating against the processing of quality rice in the area.

Literature Review
Rice is a main source of nourishment and the second largest cereal in the world after wheat (Kadiri, 2014). It is one of the most important commercial food crops in Nigeria (Ohen and Ajah (2015). Over half of the world population including those living below poverty threshold rely heavily on parboiled rice (Ghadge and

Prasad, 2012). It is categorised as the fourth major cereal crop in Nigeria in terms of cultivated land area and output (Ohaka *et al.,* 2013). However, Dimelu *et al.* (2014) and Reynolds (2016) reported that an estimated 70.0% of the Nigerian populace feed essentially on rice, which provides 75.0% calories and 55.0% proteins to the average daily diet of consumers. Rice grains and its by-products are equally useful in the manufacturing of alcoholic beverages. The low-fat content is important when used in brewing beer. It is also used as livestock feed in the form of rice bran and hay (Gbadamosi and Daniel, 2014). Milled rice in form of powder is used in the preparation of infant weaning foods because of its high digestibility, especially when mixed with milk (Aremu, and Akinwamide, 2018). Rice processing would promote higher profits, more stable market conditions, job creation, diversification of products and markets, and down-stream economic benefits through industry support sectors. Hence, large scale rice production should be considered as one of the major ways of ensuring food security for the teaming population in Nigeria (Herrmann *et al.,* 2017; Osabohien *et al.,* 2017).

Ibitoye *et al.* (2014) revealed that rice processing was profitable in Nigeria, but net return was significantly (1%) affected by educational status, household size, distance to farm and sex of the processor. The major problems affecting rice processing were inadequate capital, price fluctuation and high cost of transportation. Nwachukwu *et al.* (2020) found that packaging was the only form of branding carried out by processors. The factors affecting the branding of home-grown processed rice include non-availability of

new technology, labour and cost of packaging materials. They opined that rice processors should be trained adequately on branding and there should be provision of the required technology to improve the quality of home-grown processed rice and make it competitive with imported rice thereby increasing its demand. Hussaini *et al.* (2019) found that the average rate of returns on investment in rice processing was ₦1.25 indicating that every ₦1 invested in value addition to rice in Kebbi State yielded a profit of ₦1.25. Uke *et al.* (2018) also revealed that the average total revenue from paddy sale per ha was N300,000 while total revenue from milled rice was N525,000. The findings imply that rice farmers realized more income from selling their produce in milled form than in paddy form.

The study of Omoare and Oyediran (2020) in Ogun State showed that value addition to rice was ₦350/kg at production stage, ₦500/kg at processing stage and ₦750/kg at marketing stage. This implies that value addition increases from production to marketing and throughout the rice value chain. They stressed that value addition to rice is very important to help the rural poor farmers out of poverty. Chidiebere-Mark (2017) reported in his findings that gross margin accruing to the rice processor or marketer on a metric ton of basic milled rice was ₦55,800 at a processing cost of ₦2,600 which also comprised costs of de-stoning and bagging. Amolegbe *et al*. (2016) identified parboiling and milling operations as the most important processing operation along the value chain. An average revenue of ₦424,838 was generated from processing operation while a cost of ₦256,612 was incurred thereby giving an average processing

market margin of ₦168 225. They opined that improved processing equipment and quality control is essential to increasing the quality and price of processed rice at the consumer level.

The challenges encountered by farmers in rice processing cuts across the value chain including inadequate finance and high cost of processing which make it very difficult for individual processor. Consequently, there is a need for support from the government, private investors, non-governmental organizations and other stakeholders to promote rice processing through adequate funding beyond a subsistence level (Osabuohien *et al.,* 2018). The traditional method of processing including the use of firewood, sun-drying and packing increase the chances of harbouring dirt and contamination with stones, which adversely affect the perception, acceptability and marketability of the locally processed rice. This local method of value addition in Nigeria affects the revenue from processed rice due to the grains mixed with contaminants. Therefore, modern method such as electricity, mechanical dryer, solar equipment and de-stoning machine should be used. Samson (2018) asserted that the preference of the Nigerian population for imported rice was influenced by factors such as cleanliness, taste, texture, flavour, swelling capacity and affordability. Nigerian rice producer should improve the quality of the rice for it to have competitive advantage over imported rice while there must be campaigns against importation of large tons of rice into the nation's rice market.

Study Area

The study area is Obafemi-Owode Local Government Area (LGA) of Ogun State, Nigeria, Latitude 6°56′59.99″ N Longitude 3°29′59.99″ E and its headquarters is Owode town at 6°57′ N 3°30′ E. The LGA is made up of a land mass of 104,787.07 hectares which is largely an agricultural land consisting of rice growing communities where value addition activities are also major occupation among rice processors. The humidity of the area is relatively high with average daily temperatures ranging between 25°C and 29°C and abundant rainfall of over 1500 mm annually during most of the year (Weather, 2017). The climate favours the cultivation of rice, maize, cassava, yam, banana and many other crops as well as rearing of livestock in the area.

Methodology

A two-stage sampling procedure was adopted in obtaining primary data from rice processors in a cross-sectional survey using a well-structured questionnaire. The first stage involved the selection of ten (10) rice processing communities including Adigbe, Oba, Kobape, Obafemi, Egbeda, Ogunmakin, Ajebo, Owode, Iro and Mokoloko towns from the Obafemi-Owode LGA while the second stage involved the random selection of between ten (10) and fifteen (15) rice processors through snowball sampling based on the size of each community. Consequently, responses from one hundred and twenty (120) completed questionnaires were used in data analysis.

The data were analysed using descriptive statistics such as frequency, percentage and mean. The cost and returns were estimated using budgetary technique while the Double-Log function of the Cobb-Douglas model was adapted to determine the factors affecting

profitability of value addition in local rice processing in the area. Gross Margin was estimated as the difference between total revenue and total variable costs. The equation is specified following Abdulaleem et al. (2017);

$$GM = PQ - \sum_{j=1}^{m} C_j X_j \qquad (1)$$

The Net income (NI) is the difference between the gross margin and total fixed cost of the rice processors as given below;

$$NI = GM - TFC \qquad (2)$$

Where,

GM = Gross margin of rice processing enterprise

P = Price per kg of processed rice,

Q = Quantity of processed rice,

C_j = Unit price of variable input j,

X_j = Quantity of variable input j,

m = Number of variable input used,

NI = Net income,

TFC = Total fixed cost.

The following ratios were estimated to examine the economic performance of the rice processing enterprises;

$$\text{Profitability index} = NI/ TR. \qquad (3)$$

This measures the ability of the rice processing enterprises to pay their short-term debt off with cash generated.

Rate of Return on Investment (RRI) = TR/ TC. (4)

It measures the rate of returns on capital invested in the business or the profit accruing to owner's equity.

The Analytical Model

The Cobb-Douglass model that was adapted to examine the factors affecting profitability of local rice processing in the area of study is of the following form:

$$Q = \beta_0 X_{1i}^{\beta_1} X_{2i}^{\beta_2} .... X_{ni}^{\beta_n} e \qquad (5)$$

The Double-log function of the model is expressed as;

$$lnQ_i = ln\,\beta_0 + \beta_1 lnX_{1i} + \beta_2 lnX_{2i} + ...i + \beta_n lnX_{ni} + \mu i. \qquad (6)$$

$i = 1,2,3....n$

The isoquant of the Cob-Douglas function is convex to the origin implying that it obeys the law of diminishing returns. The respective partial input elasticity is the coefficient of each explanatory variable (β_i) while $\sum\beta_i$ is the total production elasticity, which is non-negative ($\sum\beta_i \geq 0$) and it measures return to scale. The scale factor is positive (i.e. $\beta_o > 0$) and its elasticity of substitution is equal to one. According to Okoye *et al.* (2008) and Oyebanjo (2023), the best results of the Cobb-Douglas function is obtained from the Double-log form while other functional forms including linear, semi-log and exponential functional forms are tried only when satisfactory results are not obtained from the Double-log function.

The equation for estimating the determinants of profitability among the rice processors is specified as:

$$lnQ = \alpha_0 + \beta_1 lnX_1 + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + \beta_7 lnX_7 + \beta_8 lnX_8 + \beta_9 lnX_9 + \mu_i. \qquad (7)$$

Where;

Q = Gross margin of value-added rice (₦)

X_1 = Age of Processor (years)

X_2 = Sex of Processor (1, if female and 0, if otherwise)

X_3 = Experience in rice processing (years)

X_4 = Marital status (1, if married and 0, if otherwise)

X_5 = Level of Formal Education (years)

X_6 = Labour used (man-day)

X_7 = Membership of cooperative

X_8 = Amount of Loan obtained

X_9 = Sales price per kg

α = Intercept

β = parameter to be estimated

μ = Error term

Results and Discussions

Socio-Economic Characteristics of the Rice Processors

Socio-economic characteristics have been found to influence economic practices and profitability. Table 1 shows that majority (80.8%) of the rice processors were less than 50 years old, 19.2% was 50years old and above while an average processor was about 41 years old. It means that the rice processors were relatively young and active to effectively carry out the various operations of value addition in rice processing. The process of value addition in rice was dominated by male (89.2%) while female constituted 10.8%. This result corroborates the findings of Ajewole *et al.,* (2015). However, majority (77.5%) of the rice processors were married, 13.3% was single while 9.2% was either widowed or divorced. About 70.8% of the respondents were rice processors by primary occupation, 22.5% were farmers who engaged in rice processing possibly to earn increased farm income while 6.7% were either artisans or civil servants.

The rice processors with, at least, primary education was slightly above average (53.3%) while 46.7% had no access to formal education. This result corroborates the findings of Bello *et al*. (2020) who reported low level of formal education among rice processors in Nigeria. Majority (50.8%) of the respondents had less than 10 years of rice processing experience, about 49.2% had up to 20 years or more while the average processing experience was about 11 years. High level of experience is expected to promote the economic performance of the processors. The result revealed further that 52.5% of the household had 4-6 household members, 30.8% had more than 6 members while the average household size was 5 persons. Household size of the processors could influence availability of family labour, proportion of home consumption and quantity of processed rice available for sales. Furthermore, 40.8% of the processors participated in cooperative society while 51.2 were non-members. Meanwhile, cooperative participation will enhance the access of a processor to loan acquisition at low interest rate. It could also grant the cooperative members the opportunity to benefit from government supports and programme, which can promote the profitability of rice processing in the area. The goal of the rice processors was mainly for commercial purpose (93.3%) while 6.7% of them were engaged in rice processing for home consumption.

Table1: Distribution of Socioeconomic Characteristics of Respondents

Variable	Frequency	%	Mean
Age			
≤ 30	19	15.8	
30-<40	36	30.0	
40-< 50	42	35.0	41.12
Above 50	23	19.2	
Sex			
Male	107	89.2	
Female	13	10.8	
Marital Status			
Single	16	13.3	
Married	93	77.5	
Divorced/ Widowed	11	9.2	
Major Occupation			
Rice farming	27	22.5	
Rice processing/ trading	85	70.8	
Artisanship/ Civil service	8	6.7	
Formal Education			
None	56	46.7	
Primary	38	31.7	
Secondary	17	14.1	
Tertiary	9	7.5	
Experience in rice processing			
< 10	61	50.8	
10-< 20	33	27.5	11.37
Above 20	26	21.7	
Household Size			
1-3	20	16.7	
4-6	63	52.5	5.24
Above 6	37	30.8	
Cooperative membership			
Non-member	71	51.2	
Member	49	40.8	
Goal of Rice Processing			
Commercial	112	93.3	
Family consumption	8	6.7	
Total	120	100.0	

Cost and Returns of Value Addition in Paddy Rice Processing

The estimates of the cost and returns of value addition in paddy rice processing in the area are shown in Table 2. The cost of paddy constituted the highest proportion (46.7%) of total cost followed by labour cost (15.1%) while value addition operations like soaking, threshing, winnowing, parboiling, drying, milling sorting, grading and packaging summed up to 16.8% of total cost. Ofada rice variety constituted the major processed rice in the area with the highest revenue of ₦372,447.45 while Agric rice variety generated revenue of ₦97,522.52. The

result shows that labour was relatively expensive among other inputs and operations of value addition in paddy rice processing.

The total variable cost was78.6% of total cost (₦243,184.18). Total fixed cost including interest on loan and depreciation of tools/ equipment was minimal at 21.4%. An average rice processor made a gross margin of ₦315,261.26 with profitability index (PI) and Rate of return on investment (RRI) of 0.56 and 1.93 respectively. The profitability index shows that net income (NI) was higher than total revenue (TR) by 56.0% while there was a return of N 0.93 on every N 1.00 invested in paddy rice processing.

Table 2: Cost and Returns of Value Addition among the Rice processors

Variable	Mean value ₦	% of Total Cost
Revenue from processed Ofada rice	372,447.45	
Revenue from processed 'Agric rice'	97,522.52	
Total revenues (TR)	469,969.97	
Cost of Variable Inputs		
Paddy of Ofada rice variety	99,666.67	41.0
Paddy of Agric rice variety	18,024.02	5.7
Soaking	5,655.66	2.3
Threshing	4,110.11	1.7
Winnowing	3,925.93	1.6
Parboiling	4,033.03	1.7
Drying	3,489.49	1.4
Milling	5,110.11	2.1
Sorting	3,925.93	1.6
Grading	3,032.03	1.2
Packaging	3,489.49	1.4
Hired labour cost	36,775.78	15.1
Total Variable Cost	191,238.24	78.6
Cost of Fixed Inputs		
Depreciation on tools & implement	15,186.19	6.2
Interest on loan	36,759.76	11.7
Total Fixed Cost (TFC)	51,945.95	21.4
Total cost (TC)	243,184.18	100.0
Gross Margin (GM)	315,261.26	
Net Income (NI)	263,315.32	
Profitability Index (PI)	0.56	
Rate of Return on Investment (RRI)	1.93	

Determinants of Profitability among the Rice Processing Enterprises

The estimates of the factors affecting profitability among the paddy rice processing enterprises are presented in Table 3. The F-value for the linear (31.971) and double-log estimating equations (6.325) were significant at $p<0.01$ respectively indicating that the model has the explanatory power of the data. The linear regression was selected as the lead equation based on the higher number of significant explanatory variables and adjusted R^2 (0.646) which

implies that the variables in the model accounted for 64.6% of the variations in profitability of value addition among the local rice processors while 38.6% could be attributed to unfavourable weather condition during processing and fluctuation in market prices. The estimates revealed that age of the processors (0.146) had a positive and significant (p<0.10) relationship with profit obtained in adding value to paddy rice. Thus, age significantly promoted rice processing enterprise probably due to the relatively young age of the processors, their agility and strength. The coefficient of sex (0.762) is positive and significantly different from zero at p<0.01 indicating that the likelihood of being a male has important roles in local rice processing in the area. This might be due to tedious activities performed by men such as threshing, firewood fetching, machine operations and so on. Processing experience in rice (-0.100) had a negative but significant coefficient at p<0.10. Thus, experience was probably low in processing quality local rice that is competitive to imported rice thereby affecting the market price and income. Formal education has a negative and significant relationship with profitability (-0.201) at p<0.05 probably due to high level of illiteracy or lack of understanding effective resource utilization. Hence, the education of the processors could be complemented with extension training to improve quality rice processing. More so, labour had a significant negative coefficient in relationship with profitability (-0.056) at p<0.05. This means that labour had a reducing effect on profitability. This could be attributed to high cost and drudgery of manual labour, which could also lead to contamination of milled rice with stones or dirt during parboiling, sun-drying among other traditional methods of processing.

Table 3: Estimates of Factors Affecting Profitability of Paddy Rice Processing

Variable	Linear		Double-log	
	Coefficient	t-value	Coefficient	t- value
Constant	0.437**	2.027	-1.554***	-3.106
Age of processor	0.146*	1.941	0.023	0.562
Sex of processor	0.762***	6.939	0.012	0.242
Experience in rice processing	-0.100*	-1.722	0.062	1.582
Marital status	0.054	0.955	0.032	1.078
Formal Education	-0.201**	-2.776	0.041*	2.050
Labour used	-0.056**	-2.071	0.079	1.521
Cooperative membership	0.025	0.217	0.422***	4.019
Amount of Loan obtained	-0.058	-1.050	0.035	1.258
Sales price per kg	0.044	0.362	0.225*	1.997
F-value	31.971***		6.325***	
R^2	0.666		0.597	
Adjusted R^2	0.646		0.514	

***Significant at 1%, ** Significant at 5%, * Significant at 10%

The Constraints Militating against Rice Processing among the Respondents

The challenges confronted by the rice processors are presented in Table 4. The results revealed that poor processing and storage facilities were the major problem confronted by 80.0% of the processors. This is possibly due to lack of modern equipment for rice processing. High cost of material input particularly paddy (75.0%) was ranked as the second challenge. This indicates scarcity of paddy rice possibly as a result of low farm production. The third problem was unstable demand for processed rice. Perhaps, the quantity of imported rice available in the market could cause a variation in the market price of locally processed rice. Furthermore, the local rice processors also experienced inadequate support from government (64.2%) and low finance emanating from inadequate access to loan (62.5%). The identified problems are prerequisites for government to formulate appropriate policies and programme towards promoting effective value addition in local rice processing in the area.

Table 4: Constraints Militating against Rice Processing in the Study Area

Constraint	Frequency	Percentage	Rank
Low finance/ Inadequate access to loan	75	62.5	5th
Poor processing facilities and storage	96	80.0	1st
Unstable market price/ demand for local rice	82	68.3	3rd
High cost of paddy rice/ material input	90	75.0	2nd
Inadequate government support	77	64.2	4th

Conclusion and Recommendation

The findings revealed that the rice processors were relatively young and active at mean age of 41 years old. About 46.7% of them had no formal education while half (50.8%) had less than 10 years of rice processing experience implying the need for extension training to ensure improved and effective value addition to paddy rice in the area. Majority (93.3%) were commercial rice processors, 51.2% were non-members of cooperative while 62.5% complained about inadequate access to loan. Paddy rice was very costly at 46.7% of total cost of processing. This is an indication of scarcity. Though, rice processing was lucrative at profitability index (PI) and Rate of return on investment (RRI) of 0.56 and 1.93 respectively. Labour had reducing effect on profitability possibly due to its high cost and the traditional method of processing which is associated with drudgery and contamination of rice with stone or dirt. The major constraint confronted by the rice processors (80.0%) was poor processing and storage facilities.

The study concluded that local rice processing is a lucrative enterprise with manual labour having a significant reducing effect on profitability. Therefore, government should also support the processors with provision of modern equipment in order to reduce manual labour as well as increase the quantity of locally processed rice in the area. The rice processors should be educated through extension services about processing of quality rice to make it more competitive with imported rice. The rice farmers should be supported simultaneously in order to ensue massive production of paddy rice for continuous process of value addition while the rice processors should

increase their participation in cooperative societies so that they may have access to increased cooperative finance at low interest rate.

References

Abdulaleem, M.A., Oluwatusin, F.M. and Kolawole, A.O. (2017). Analysis of Costs and Returns on Maize Production among Small-scale Farmers in Osun State, Nigeria. *Report and Opinion,* 9(5): 89-92.

Amolegbe, K.B. and Adewumi, M.O. (2016). Value Chain Analysis of the Rice Industry in Nasarawa State, Nigeria Gashua. *Journal of Irrigation and Desertification Studies*, 1(2): 1-20.

Ajewole, O., Ayinde, E.O., Ojehomon, V., Agboh-Noameshie, R. and Diagne, A. (2015). Gender Analysis of Agricultural Innovation and Decision Making among Rice Farming Household in Nigeria. *Journal of Agricultural Informatics*, 6(2): 72–82.

Aremu, J.O. and Akinwamide, B. (2018). Prospects and challenges of sustainable rice production in Igbemo Ekiti, Southwest Nigeria. *European Journal of Educational and Social Sciences*, 3(2): 125 - 143.

Bello, L.O., Baiyegunhi, L.J. and Danso-Abbeam, G. (2020). Productivity impact of improved rice varieties' adoption: Case of smallholder rice farmers in Nigeria. *Economics of Innovation and New Technology,* 30(8): 1–17.

Chidiebere-Mark, N.M. (2017). Analysis of value chain in rice production system in Ebonyi State, Nigeria. A PhD thesis submitted to Department of Agricultural Economics, Federal University of Technology, Owerri. 204pp.

Demont, M. (2013). Reversing Urban Bias in African Rice Markets: A review of 19 National Rice Development Strategies. *Global Food Security*, 2: 172–181. Discussion Paper 01301, International Food Policy Research Institute, Washington, D.C.

Dimelu, M.U., Enwelu, I.A., Attah, C.P. and Emodi, A.I. (2014). "Enhancing Performance of Farmers' Cooperative in Rice Innovation System in Enugu State, Nigeria" *Journal of Agricultural Extension,* 18(2): 206-219. December**.** http://dx.doi.org/10.4314/jae.v18i2.21.

Food and Agricultural Organization, FAO (2016) Rice information. FAO Statistics Division, Italy. (statistics/images/stories/wrs-novo8-tables. http://beta.irn.org

Food and Agricultural Organization, FAO (2017). A Database of the Food and Agriculture Organisation of the United Nations (FAO). http://faostat.fao.org

Food and Agricultural Organization, FAO (2018). A Database of the Food and Agriculture Organisation of the United Nations (FAO). http://faostat.fao.org.

Fasoyiro, S.B., and Taiwo, K.A. (2012). Strategies for Increasing Food Production and Food Security in Nigeria. *Journal of Agricultural and Food Information*, 13(4): 338-355.

Gbadamosi, A.E. and Daniel, M.M. (2014), "Effect of Light Intensity on Growth and Yield of Nigerian Local Rice Variety-Ofada". *International Journal of Plant Research*, 4(4): 89-

94.   DOI:
10.5923/j.plant.20140404.01

Ghadge, P.N. and Prasad, K. (2012). Some physical properties of rice kernels: Variety PR-106. *Journal of Food Processing and Technology,* 3(8): 175-179.

Gyimah-Brempong, K., Johnson, M. and Takeshima, H. (2016). The Nigerian Rice Economy: Policy Options for Transforming Production, Marketing, and Trade. Pennsylvania: University of Pennsylvania Press, USA.

Herrmann, R., Jumbe, C., Bruentrup, M. and Osabuohien, E. (2017). Competition between Biofuel Feedstock and Food Production: Empirical Evidence from Sugarcane Outgrower Settings in Malawi. *Biomass and Bioenergy*, http://dx.doi.org/10.1016/j.biombioe.2017.09.002.

Hussaini, A.S., Oladimeji, Y.U., Sanni, S.A. and Abdulrahman, S. (2019). Determinant and profitability of rice farmers investment in value addition activities in Kebbi State Nigeria. *International Journal of Social and Economic Research,* 3(2): 101-109.

Ibitoye, S.J., Idoko, D. and Shaibu, U.M. (2014). Economic assessment of rice processing in Bassa Local Government Area of Kogi State, Nigeria. *Asian Journal of Basic and Applied Sciences,* 1(2): 8-17.

Johnson, M., Takeshima, H. and Gyimah-Brempong, K. (2013). Assessing the Potential and Policy Alternatives for Achieving Rice Competitiveness and Growth in Nigeria. *The International Food Policy Research Institute (IFPRI)*. IFPRI Discussion Paper, 01301.

LarocheDupaze, C. and Postelle, A. (2013). Food sovereignty and agricultural trade policy commitments: how much leeway do West African nations have. *Food Policy,* 38: 115-125.

Nneka C., Donatus O., Polycarp O. and Steve O. (2019). Profitability of rice production in different production systems in Ebonyi State, Nigeria. *Open Agriculture,* 4(1): 237-246.

Nwachukwu, C.U., Ukwuaba, I.C. and Umeh, J.O. (2020). Constraints Faced by Rice Processors in Milling and Branding of Home-Grown Rice in Enugu State, Nigeria. *Journal of Agricultural Extension;* 24(1): 118-127.

Odumade, B. (2018). Emulating Lagos-Kebbi rice partnership people first Osun defender.com/improving local rice production in Nigeria, p5-7).

Ogun State Agricultural Development Project (OGADEP), 1991. Annual Report, OGADEP, Abeokuta, Nigeria.

Ogunsumi, L.O., Ajayi, A., Amire, C.M. and Williams, S. (2013). Sustainability of Agricultural Transformation Agenda. The place of Rice Farmers in Ogun State Nigeria. *Research on Humanities and Social Sciences,* 3(13): 66-78.

Ohaka, C.C., Adiaha, M.M. and Amanze, P.C. (2013). Economic analysis of small rice production in Ihitte-Uboma LGA of Imo State. *Niger. J. Agric., Food and Environ.,* 9(2): 37-41.

Ohen, S.B. and Ajah, E.A. (2015). Cost and return analysis in small scale rice production in Cross River State, Nigeria. *International Research*

Journal of Agricultural Science and Soil Science, 5(1): 22-27.

Okoye, B.C., Onyenweaku, C.E., Ukoha, O.O. Asumugha, G.N. and Aniedu, O.C. (2008). Determinants of Labour Productivity in Small-holder Cocoyam Farms in Anabra State, Nigeria. *Scientific Research and Essays*, 3(11): 559 – 561.

Omoare, A.M. and Oyediran, W.O. (2020). Factors Affecting Rice Farming Practices among Farmers in Ogun and Niger States, Nigeria. *Journal of Agricultural Extension*, 24(4): 92-103.

Osabohien, R., Osabuohien, E. and Urhie, E. (2017). Food Security, Institutional Framework and Technology: Examining the Nexus in Nigeria Using ARDL Approach. *Journal of Current Nutrition and Food Science,* 13(4): 1-10.

Osabuohien, E., Okorie, U. and Osabohien, R. (2018). Rice Production and Processing in Ogun State, Nigeria: Qualitative Insights from Farmers' Association. In Obayelu, E. (Eds). Food Systems Sustainability and Environmental Policies in Modern Economics, pp.188-215. Hershey, PA: IGI Global. DOI:10.4018/978-1-5225-3631-4.ch009.

Oyebanjo, O., Shittu, A.M. and Olubanjo, O.O. (2006). Resource Use Efficiency in Rice-Based Farms in Obafemi-Owode LGA, Ogun State, Nigeria *ASSET: An International Journal, Series A*, 6(1): 189-200.

Oyebanjo, O., Ologbon, O.A.C. and Dada, O.M. (2023). Effect of Land Fragmentation and Socioeconomic Factors on Food Crop Productivity in Ogun State, Nigeria. *Euroeconomica,* 42(1): 152-163.

Reynolds, A.A. (2016), "Analysis of the Demand for Locally Produced Rice in Kumasi, Ghana". An M.Phil. Thesis Submitted to the Department of Economics, Kwame Nkrumah University of Science and Technology, Ghana.

Samson, E.O. (2018). Preference for imported and Nigeria rice among rural households in Imo State Nigeria. *Journal of Agricultural Extension,* 22(3): 53-63.

Uke, P.C., Ochiaka, D.C. and Mgbakor, M.N. (2018). Value Addition Assessment of Rice Production in Anambra East Agricultural Zone of Anambra State. *Asian Research Journal of Agriculture,* 9(3): 1-5.

USDA (2018). Retrieved from United State Department of Agriculture Database: https://ndb.nal.usda.gov/ndb/search/list.

West Africa Rice Development Association (WARDA, 2015). The reason why Nigerians are hooked to rice women's involvement in the agro-processing enterprise of the national special programme for food security in Imo State, Nigeria. *Report and Opinion*, 2(7): 69-73.