

RICE FARMING

Edited by:
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Foreword

Rice is the foremost staple food in Nigeria. Generally it is the most important commercial staple food in Africa and the world. Almost every other continent except Africa produces sufficient rice to feed its region, and spill over its politectonic zone. Nigeria is in Africa which does not produce enough rice to feed its increasing youthful population, yet its staple food is rice.

Yet again its population is growing almost meteorically faster than the growth rate of its staple food production. Faster than its holistic food production. This strange unplanned economic/characterization does not only open us to the structural vulnerability of excessive importation of our staple food over non export. It opens us to hunger, disease, strife and early mortality since we do not always afford to import enough to feed the hungry population. It depletes our scarce foreign reserves earned by the dwindling quantity and value of our crude oil. It creates our dependence on others for what we eat to survive as a nation. It diminishes our independence and national security and therefore surreptitiously threatens our sovereignty.

But recently, Nigeria has woken up from a long period of coma to realize this stark reality. After the declining fortune in nonrenewable energy resource (crude oil) agriculture has taken on the centre stage in current dialogue and might continue to earn that position as there is nothing else to substitute food for energy and survival. And we are limited by any other choice.

It is at this critical conjuncture that Vika Farms has come in to make a modest contribution to knowledge, to transform dialogue into academic practice and socialize practice for the common good. This book is written by the theoreticians who are our **Agricultural Consultants** in rice production. What they state in theory is practicalized concretely at **Vika's rice farm unit** under the tutelage

of Dr. Aderi O.S., the main consultant. From the preparation of the rice field to the planting, harvesting, processing and its integration at other aspects of agriculture are contained in the book but we must make some distinction here and categorically state without mincing words that we are not basically rice farmers perse. Our education department has a model rice farm that breaks down theory into practice for training purposes.

Our objective here is to create awareness and raise the public consciousness of our people to grow what they eat for energy and survival. For the state government to complement our novelty either through policy formulation and implementation that takes on agriculture seriously as the main stay of the economy or through direct subsidies to the **real farmers**. For the Federal Government to harness the efforts of the various state governments that have shown practical interests in rice farming by providing adequate and necessary farming machineries, equipments, tools, implements and other relevant logistics for the optimization of rice production in Nigeria. Not necessarily for domestic consumption only, but additionally for export.

When the productive capacity of our staple food is fully harnessed, utilized and exploited maximally with the resultant optimal increase in productivity, then we can give credence to food security in Nigeria which is a critical component of our national security system. **This is our mission statement.**

Asikpo J. Essienibok (Ph.D)

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Preface

The Sustainable Development Goals (SDGs) continue to emphasize the issue of eliminating poverty and hunger everywhere and anywhere indicating that most countries failed short of this target at the close of the Millennium Development Goals (MDGs) implementation. There is a lot of wisdom, foresight and courage by the Nigerian Federal Government for the first time paying adequate attention to the real growth of agriculture after more than sixteen years of consistent neglect. This honest effort by the present administration as encapsulated in the Green Alternative has been adopted as a working document for charting a sustainable road map to our economic recovery and advancement and further diversification of our economy which has not been seriously pursued by previous governments.

In this book, effort is made to practice 'sole writing' similar to sole cropping to derive maximum benefits from the commodity of choice – Rice which has been adopted as one of the agro-commodity promoted on the value chain approach of improving our crop production systems.

Rice has become a security crop with a socially ascribed mandate of also being a cash crop. Efforts of government will likely increase the 15 million farmers previously employed in its value chain to four times or more. With the demand for rice reaching a crisis point in Nigeria, the demand to increase our interest in its production becomes inevitable. Nigeria continues to consume more rice than she produces; consumption is expected to jump to 35 million metric tons by 2050.

In this book rice production is treated in most if not all the critical areas that will serve as an extension manual, training kit

and reliable reference guide. Carefully researched and up- to -date information on field operations, processing, storage and marketing are extensively covered in simple language style. It begins with the basic concepts of rice and cultivation practices. The by-products of rice and their utilization in livestock nutrition are described in Chapter two. Chapter three presents in detail rice-cum-fish culture system while the role of Rice in Nigeria Agriculture is covered in Chapter four. In chapter five, post production of paddy rice into consumable and value added products are discussed. The use of rice as forest plantation in ecosystems is covered in Chapter six. As usual the agribusiness component is not ignored which is a major indicator of shifting rice is farming from subsistence cultivation to a business farming approach. This is discussed in Chapter seven.

Readers will find this book a good academic material, business handbook companion and of general interest that also gives information on the history of the crop which today has broken all cultural barriers to become a global staple of all times. It is hoped that this will contribute to the implementation of the Green Alternative of the Government in helping the Nation to be not only Food Secured but a net exporter of Rice beyond the African continent.

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Profitability of Rice Farming in Nigeria

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7.0 Introduction

Rice is the seed of the grass species *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). It is the seed of the monocot plant *Oryza spp.* of the *poaceae* family (Kuldeep, 2006). As a cereal grain, it is the most widely consumed staple food for a large part of the world's human population, especially in Nigeria. It is the agricultural commodity with the third-highest worldwide production, after sugarcane and maize, according to 2012 FAOSTAT data (FAOSTAT, 2014). Rice is the most important grain with regard to human nutrition and caloric intake, providing more than one-fifth of the calories consumed worldwide by humans (Smith, 1998). Rice is a political commodity, hence a political strategy and not a poverty strategy; thus supply and demand in the World market as both importing and exporting countries stabilize rice prices internally by using the World rice market to dispose of the surpluses or meet the deficits via imports. This makes the supply and demands for the commodity in the World market the direct result of political decisions in a large number of countries including Nigeria. Nigerian politicians have used rice with other commodities to strengthen and sustain their political constituencies in all the years of civilian/democratic rule since independence. If countries were open to rice production and trade, they would be more richer and not poorer. The big question is how to make that openness possible when policy makers and the

general public distrust the local rice market for reasons that are easy to understand.

7.1 Rice Production in Nigeria

Rice has become an important strategic and daily staple food crop in Nigeria. The potential land area for rice production in Nigeria is between 4.6million and 4.9million ha. Out of this, only about 1.7million ha or 35percent of the available land area - is presently cropped to rice. Small-scale farmers with farm holdings of less than 1 ha cultivate most of the rice produced in Nigeria. However, rice productivity and production at the farm level are constrained by several factors. These constraints include: ineffective farmer organizations and groups, low yield and poor milling quality of local rice varieties, poor marketing arrangements, inconsistent agricultural input and rice trade policies, poor extension systems and environmental constraints. These environmental constraints include: poor drainage and iron toxicity in undeveloped lowland swamps, poor maintenance of developed lowland swamps, droughts, deficiencies in N and P, insufficient rain for rain-fed lowland rice production, and poor soil management practices (Nwilene *et al*, 2010).

Farmers need to be taught how to prepare land and nursery beds, quantity of seed to plant per hectare, when to transplant their rice, how to apply inputs such as chemical fertilizers and herbicides, the weeding regimes and disease control methods, among others. This topic is designed to address the marketing and profitability of rice and assist rice farmers to obtain higher returns on their investment in rice production in Nigeria.

7.2 Distribution and domestication of Rice

In a recent study (Talhelm, 2014), scientist have found a link for differences in human culture based on either wheat or rice

cultivating races since ancient times. African rice has been cultivated for 3500 years. Between 1500 and 800 BC, *Oryza glaberrima* propagated from its original centre, the Niger River delta, and extended to Senegal. However, it never developed far from its original region because scientists do not have the interest to hybridize this variety to adapt in other regions (Usanga et al, 2015). Its cultivation even declined in favour of the Asian species, which was introduced to East Africa early in the common-era and spread westward (Maddox, 2006). African rice helped Africa conquer its famine of 1203 (NRC, 1996). Today, the majority of all rice produced comes from China, India, Indonesia, Bangladesh, Vietnam, Thailand, Myanmar, Pakistan, Philippines, Korea and Japan. Asian farmers still account for 87% of the world's total rice production (Wikipedia, 2015).

7.3 Reasons for Investment in Rice Farming

Nigeria rice production remains insufficient to fulfill demand. Demand have always outpaced production which results in importation of rice (mostly from South East Asia) to complete the shortfall. Rice importation contributes to the 11% of the growing food imports which is quite expensive and constantly fueling domestic inflation (ATA, 2011). Nigeria is the second largest importer of rice after the United States of America at \$2bn or \$6m per day which translates to hundreds of tons annually (Adesina, 2012). Ironically, Nigeria continues to import what it can produce in abundance and even export. Rice remains an increasingly important crop in Nigeria (Kadiri, *et. al.*, 2014) which grows virtually in all the agro ecological zones of Nigeria (Ajijola, *et. al.*, 2012, Kuldeep, 2006). Several countries of Asia and Africa are highly dependent on rice as a source of foreign exchange earnings and government revenue (Rice Trade, 2011).

Rice constitute the largest share of household total food expenditure, ranging between 28 and 21% among the high income and urban households to 28 to 24% among the low income and rural households but mostly among married rural households as well as mostly among married and the medium – size male – headed households (Erhabor and Ojogbo, 2011). This study further shows that as a normal food commodity, a necessity with no substitute, price inelastic, expenditure inelastic, rice takes an average of 21.25% of the food budget share of a rice-consuming household; for every ₦1.00 (One Naira) unit income and expenditure there is an increase in budget share of rice by 6.05% for one Naira increase in its unit price (Daramola, 2005). Demand for rice in Nigeria has always been on the increase and it is projected to increase to 6.5 and 10.1 million on tons by 2020 (Lancon and Erenstein, 2002). While the consumption of other cereals like sorghum and millet have decreased from 61% in the early 1970s to 49% in the early 1990s, Rice consumption has increased from 15 – 26% over the same period (Awe, 2006) and current demand translates to \$6m daily worth of the commodity (Adesina, 2012).

In Nigeria today, several rice varieties grow and yield profitably in dry seasons, making it a crop that is produced without weather limitations. Integrated rice mills have demonstrated 42 to 56% internal Rate of Returns within a payback period of two years on the investment (Adesina, 2014). Rice farming, therefore, is attractively profitable in all agricultural zones of Nigeria.

7.4 Profitability of Rice Farming

Every investor is driven by profit motive into any given venture. Rice farming, as a business must therefore be sustained by the benefits (profit) derivable from it. Several empirical evidences abound which attest to the profitability of rice farming

whether in the upland or swamp ecosystems (Uwem, 2001, Nwike and Ugwumba, 2015; Raufu, 2014; Nwaobiala and Adesope, 2014; Tashikalma, Giroh and Ugbeshe, 2014; and Para adigne, Ibamba and Manful, 2015).

Profitability of rice farming is a function of many factors. It could be a reflection of how well the farmers are able to combine available inputs (factors of productions) to achieve a given level of output (technical efficiency). It could also be influenced by the type of rice species (or cultivar) and or the ecology i.e. (upland versus swamp areas) where farming is taking place (Nwaobiala and Adesope, 2013 and Tashikalma, Giroh and Ugbeshe, 2014).

While several *profitability approaches* abound, the enterprise budgeting analysis with related indicators will suffice to demonstrate why investors should go into rice farming. It is also important to state where items are placed in determining profitability generally before the presentation of values and actual calculations. Two major costs are critical in determining profitability, these are: variable costs (VC) and fixed cost (FC), whose corresponding sums, Total Variable Cost (TVC) and Total Fixed Cost (TFC) are usually the central focus in most farm profitability analysis.

(a) Variable Cost: These are costs that must be incurred in the course of farming (production), whose amount depends on the size of production or how much is planned for or actually produced. Ideally, seeds, fertilizers, agro-chemicals, labour and transportation belong to this cost. Most unclassified expenses that are sometimes presented as miscellaneous items also vary with the volume of production. The name is therefore derived from their corresponding changes in values with the scale of production.

(b) **Fixed Cost:** Usually, these are costs incurred in the course of production, which do not change. Components of fixed costs are usually held constant within a reasonable short time interval and its contribution (value) into production is usually estimated for the period (or. production year (s)) in several economic analyses including determining the profitability of the farm enterprise. Cost of land, equipment, buildings and fixed farm assets like hoes, cutlass, silos, among others can be considered fixed within a production period.

7.4.1 Profitability analysis

Profit is a financial benefit that is realized when the amount of revenue gained from a business activity exceeds the expenses, costs and taxes needed to sustain the activity (Ghimiray *et al.*, 2007). Profit margin is a ratio of profitability calculated as net income divided by revenues, or net profits divided by sales. It measures how much out of every shilling of sales an individual farmer or businessman actually keeps from the money he earned through business (FAO, 2007). Gross margin (also called gross profit margin or gross profit rate) is the difference between revenue and cost before accounting for certain other costs. Generally, it is calculated as the selling price of an item, less the cost of produce sold, production or acquisition costs. (Alter, 2000).

Another important way of analyzing profitability is **costing-based profitability** analysis. In this form, the costs and revenues are grouped according to values and defined costing-based valuation approaches (SAP, 2009). This is the same as values of sales of a product minus cost incurred in making and moving it to the market. Marketing margins can also reveal the profitability of actors at different nodes along the product value chain. Marketing margin refers to the difference between the prevailing prices at the

two ends of the marketing hierarchy at the time when transactions take place (Ajala and Adesehinwa, 2008).

The marketing margin shows the fraction of the consumer expenditure as a commodity that is received by the producer and each of the marketing agents. Thus, the marketing margin represents the price paid for a collection of marketing services and its size reflects the structural efficiency of the marketing system. The marketing margin is used to give a close approximation of the market performance. The marketing margin can be expressed either in nominal terms or in percentages. A high marketing margin indicates inefficiency because a high cost is incurred in the provision of marketing services. According to Ajala and Adesehinwa (2008), it assumes the following formula:

$$\text{Marketing Margin} = \frac{\text{Selling Price} - \text{Supply Price}}{\text{Selling Price}} \times 100$$

where, selling price is the retail price and supply price is the producers' price. Thus, the size of the marketing margin reflects the structural efficiency of the marketing system.

As earlier stated, rice farmers' profit margin is influenced greatly by the yield volume of the cultivar and whether improved technologies of farming are employed. While some rice cultivars are better suited for the swamp environments, others do better in the upland ecologies. These combined with good husbandry practices influence how much output is obtained and ultimately the profit a farmer makes. One of the constraints farmers face in making reasonable profit is still traceable to the use of low yielding varieties even when the high yielding varieties are subsidized by government under many intervention programmes, including the National Rice Development Strategy (2009). Improved varieties for the swamp environment (e.g. FARO 44 and FARO 51 varieties) have yield in the range of 4 – 6 tones per hectares. In fact FARO

50 is documented to have a yield range of 4.0 - 6.5 (Imolehin and Wada, 1997). Similarly, the upland species (e.g. FARO, FARO 4.6 - 49) have a yield range of 2.0 - 4.5t/ha. The unimproved varieties still struggle to give below 2 tons per hectare. Presentation of different production systems scenarios is necessary at this point can give a clearer picture of the discussion so far. The first scenario is an analysis of the profitability under an upland rice production system; the details are presented in Table 7.1 is adapted from Nwike and Ugwumba, (2015).

Scenario I

Table 7.1: Profitability Analysis of Upland Rice Farming

Item	Amount (N:K)	Percentage of total cost (% of TC)
Farm Size : 1hectare		
Total Revenue(TR)	160,286.11	
Variable Cost(VC)		
Seed	6,035.065	5.14
Fertilizer	4,943.117	4.21
Agrochemical	6,011,582	5.12
Labour	88,999.59	75.80
Transportation	4,426.496	3.77
Miscellaneous	2,336.53	1.99
Total Variable Cost(TVC)	112,752.38	96.03
Total Fixed Cost (IFC)	4,661.32	3.97
Total Cost (TVC + IFC)	117,413.71	100.00
Gross Margin(GM) (GM = TR - TVC)	47,533.73	
Net Farm Income(NFI) (NFI= GF - RFC)	42,872.40	
Net Returns on Income(NROI) (NROI=NFI/TC)	0.36514	
Benefit–Cost Ratio(B/C) (B/C=TR/TC)	1.36	

From the table 2, the Total Variable Cost (TVC) amounted to ₦112, 752.38 representing 96.02% of the Total Cost (TC), while the Total Fixed Cost (TVC) was ₦4, 661.32 (3.97%). Of the Total Variable Cost (TVC), labour costs took as much as 75.80% (₦88, 999.59), which justifies its usage in profitability analysis. Sometimes, the value of this expenditure may be reduced if more family than hired labour is employed because of the relatively cheaper cost of the former than the later. However, the scale of operation and time-dependence of rice farming (just like other crop farming enterprises) usually requires that hired labour must be sourced. Net farm income stood at ₦42, 872.40. The Net Returns on Investment (NROI) (0.36514) implies that for every ₦1.00 invested in rice farming in the area, ₦0.36 was returned which confirms the business is a profitable enterprise.

The second scenario also presents profitability analysis of Rice in an Upland farming environment adapted from Nwaobiala and Adesope, (2013). The details are presented in Table 7.2.

This analysis (Table 7.2) is not different from the first scenario, except in the values of the costs and returns derivable from the business. Accordingly, total variable cost (TVC) took the largest chunk of the total cost (TC) of production recording as much as 81.57% (₦157, 574.20), the Gross Margin which gives the difference between total revenue (TR) and the total variable cost (TVC) was ₦101, 425.80. The net farm income of was ₦65. 825.80. As usually, labour cost accounted for about 75% o total cost, which is equivalent to 79% of the value of total variable cost (TVC).

The most important concern of the Agricultural Entrepreneur will be how much he/she can obtain from every one Naira invested in rice farming. This is answered by the value of the Net Returns on Investment (NROI), which analysis showed was 0.34; implying that every one Naira investment in rice production, ₦0.34k or 34k

will accrue as profit/benefit to the investor. However, the benefit cost-ratio does not differentiate between the investment and the returns. Therefore, the benefit cost ratio posts the figure as ₦1.34 meaning that for every ₦1.00 a rice farmer commits into the business, he realizes the sum of ₦1.34k.

Scenario 2:

Table 7.2: Profitability Analysis of Upland Rice Farming

Item	Amount	Percentage of Total Cost(% of TC)
Total Revenue(TR)	259,000.00	
Variable Cost(VC)		
Seed	8,526.78	5.13
Fertilizer	6,963.78	4.19
Agrochemical	8,526.06	5.13
Labour	124,301.00	74.79
Transportation	6,116.16	3.68
Miscellaneous	3,141.18	1.89
Total Variable Cost(TVC)	157,574.20	81.57
Total Fixed Cost (TFC)	35,600.00	18.43
Total Cost (TVC + IFC)	193,174.20	
Gross Margin (GM = TR - TVC)	101,425.80	
Net Farm Income (NFI) (NFI=GF - RFC)	65,825.80	
Net Returns on Income(NROI) (NROI=NFI/TC)	0.34	
Benefit – Cost Ratio(B/C)(B/C=TR/TC)	1.34	

The third scenario presents profitability analysis of Rice in a different ecology- the Swampy farming environment. This is sometimes known as paddy rice farming or wetland (Uwem, 2001). The details are presented in Table 7.3.

Table 7.3: Profitability Analysis of Swamp Rice Farming.

Item	Amount	Percentage of total cost (% of TC)	Rank
Total Revenue(TR)	121,327.06		
Fixed Cost(FC)			
Rent on Land	4,188.00	12.94	1
Depreciation on fixed cost items	2,618.00	8.094	2
Variable Cost(VC)			
Seed	4,620	14.28	2
Fertilizer	8,850.10	27.36	1
Herbicide	5,115.10	15.81	4
Family labour	1,328.00	4.116	3
Hired Labour	4,382.59	13.55	
Transportation	904.75	2.79	5
Other expenses	334.51	1.03	6
Total Variable Cost (TVC)	25,535.05	78.95	
Total Fixed Cost (TFC)	6,806		
Total Cost(TC)	32,341.05		
Gross Margin (GM = TR - TVC)	91,604.00		
Net Farm Income (NFI) (GF - RFC)	88,986.01		
Net Returns on Income(NROI) (NROI=NFI/TC)	2.75		
Benefit - Cost Ratio(B/C) (B/C=TR/TC)	3.75		

Source: Adapted from Tashikalma, et. al. (2014)

From Table 7.3, the analysis shows that the Total Variable Cost (TVC) takes the largest value of ₦25, 535.05 representing 78.95%. Interestingly, it is the cost of fertilizer that takes a greater value (%) of the total cost (TC) 27.36% compared to labour cost, which came 3rd in rank (₦ 5710.59) and 17.7% of the value of total cost. This is not to present labour cost as being lower in the Swamp farming environment. Uwem (2001) reported labour cost

as making up 70% of total cost in swamp rice farming. Total fixed cost was ₦6,806.00 or 21.05% of the total cost of producing rice under this production system. The Gross Margin value was ₦91,504.00; while Net Farm income was ₦88,986.01. The values of the Net Returns on Investment and benefit cost ratios were 2.75 and 3.75, respectively.

From this analysis, for every one Naira (₦1.00) invested in the rice farming enterprise in the swampy environment or what is called paddy rice, a farmer reaps two naira seventy five kobo (₦2.75) as returns. The benefit cost ratios value can be similarly explained to have the same meaning except that the profit and the investment (principal) is fused or not separated. The result shows that for every one Naira invested in Rice farming, the farmer realizes ₦3.75.

From the two broad categories (two upland and one swamp rice production scenarios), it is clear that both are profitable even though higher returns on investment for every one Naira investment come from swamp rice farming. The benefit-cost ratio also shows the same thing about the profitability of the business. As a rule, any benefit-cost ratio value less than one, indicates the business is not profitable, of course if it stands at exactly one it indicates equals values of cost and returns also known as the breakeven point. This is a critical situation because; the business stands at a threshold of either making profit or slipping to losses. If the value of benefit cost-ratio is greater than one, this indicates profitability. As a rule, the benefit-cost ratios value takes a greater value of less than the Net Returns on Investment because it takes into account the total revenue (TR) and total cost (TC), unlike the previous, where the farm income is used. In other words, benefit-cost ratio can be presented as investment versus returns i.e. 1: 0.36 with the same interpretation as earlier given.

Most of the profitability analysis indicates lower yield values, which is a reflection of either continued use of low yield varieties or the technical inefficiencies of the farmers due to educational level, which increases understanding and innovativeness or high labour cost (which takes 70 – 75.8% of total production cost (Uwem, 2001; Nwike, and Ugwumba, 2015). Similarly, prices of farm inputs are not fixed due to market forces; they vary from place to place and from time to time. While some rice farmers have contact with extension services, others do not. Contact with extension services increase access to productive inputs at cheaper rates, enhances improved rice farming technologies and knowledge of mitigating strategies on environmental changes and variations as well, example, climate change mitigation and adaptation. Nwaobiala and Adesope (2013) reported that Agricultural Development Programmes (ADPs) upland rice contact farmers had dominant farm size holdings of 1.2 hectares while the Swamp rice contact farmers had farms of mostly 1.1 hectares with annual income range of ₦189,410 and ₦201, 166.00 respectively, higher than the values recorded for non contact rice farmers in their study.

It must be again emphasized here that, rice farming can be more profitable if a number of things are done -both those within the control of the farmer and those that falls into the responsibilities of the government and other stakeholders. For the farmers, continuous use of extension services will increase the farmers' income, improve on his/her technical efficiencies (combining a small amount of inputs for optimum output) and provide the much needed inputs and agricultural and market information for informed farm production decisions.

For example, not only are improved rice varieties available, but there is a National Rice Development Strategy where improved rice seeds and other farm inputs are provided at highly subsidized

rates. Farmers are still using the rice varieties that are low yielding, which has serious implications on their final output and consequently their profit margin. Improved varieties such as FARO 47, FARO 48 and FARO 49 have yielding potentials, which ranges from 2.0 - 4.5 tons per hectare under good husbandry practices and these varieties are suitable for the upland rice farming environment. For the shallow swamp areas, FARO 44, FARO 50 (ITA 230) and FARO 51 have yield range of 4-6.5 tons per hectare (www.fao.org/dorep/htm) these are all varieties developed in Nigeria between 1990-2000. With this understanding, if the farmers whose production was earlier analyzed cultivated these varieties on their farms, the following results will be obtainable. In the first scenario, Net Farm Income (NFI) will increase to ₦85, 744.80 with a corresponding Net Returns On Investment (NORI) increasing to 0.730 and benefit-cost ratio will be ₦1.73. In other words, for every Naira a farmer invests in rice farming, he will get seventy three kobo (₦0.73k) as profit. This could even be higher if subsidized inputs are accessed by the farmers.

In the second scenario for upland rice farming, the Net Farm Income will become ₦131, 651.60, Net Returns On Income (NROI) will increase to 0.68 and benefit-cost ratio of 1.68 will be realized, implying a payment of ₦0.68 or 68k for every ₦ 1.0 invested in rice farming. For the upland rice farming, the output was estimated at 2, 022.12kg equivalent to 2.022 tones (Tashi kalma, *et. al.* , 2014), if the farmer were to adopt FARO 51 variety which thrives well in shallow swamps and has a yield range of 4.00-6.0 tons per hectare, then the Net Farm Income (NFI) would have increased to at least ₦1177, 972.02 with Net Returns On Investment (NROI) moving to 5.50 and benefit-cost ratio of 6.50. This by economic implication would be ₦5.50 on every ₦1.00 investment in rice production. Earlier study by Uwem (2001) reported a total revenue (TR) of ₦224, 602.00 and a Net profit of

₦168, 45150 per hectare in swamp rice farming in Akwa Ibom State. This indicated a Net Returns on Investment of 4.8 and benefit cost ratio of 5.82.

Under improved technologies, much higher returns on rice investment have been recorded. Extension agencies remain central to achievement of the rice sufficiency drive of the Federal Government of Nigeria. A technology known as the Sawah technology uses levelled rice field surrounded by bund inlet and outlet connecting irrigation and drainage canals. Empirical evidence abound where this rice farming technology with fertilizer application have increased yield to 5-6 tons per hectare (Raufu, 2014). This report showed that the benefit cost-ratio of 6.72 was realized from adoption of this (improved) technology. Rice farming will continue to be profitable since the commodity forms an integral part of the commodity value chain of interest to government in achieving food security with adequate provision of incentives (ATA, 2009). This assertion is reliably so with a carefully planned road map. The Nigerian National Rice Development Strategy (NRDS) set up in 2009 aims to make the country self-sufficient in rice by raising production of paddy rice from 3.4 million tons in 2007 to 12.8 million tons in 2018 (Adesina, 2014). This can only be achieved as more people invest in rice farming.

Apart from 57 varieties of rice being released to registered farmers at 50% subsidy, there is also a 25% subsidy on fertilizer to farmers as well as reduced custom tariffs on agricultural machinery such as tractors and processing equipment (www.inter-ressaux.org). Also, market information availability to farmers will encourage rice production since selling these produce will provide capital for more investment and expansion. In summary, profitability of rice farming will depend on how government policies toward improving the sector is faithfully implemented as well as

the farmers' action in improving their technical efficiencies as well increasing access to extension services.

7.5 Marketing of Rice

Output is important because increase marketable surplus of agro-produce has become possible due to technological breakthrough applied in agriculture. Similarly, new agricultural technology is also input-responsive which justifies agricultural marketing extending its coverage to product marketing and input marketing. In practice, agricultural marketing encompasses marketing functions, agencies, channels, efficiency and costs, price spread and market integration, producer's surplus, government policy and research.

7.5.1 Marketing Defined

Some important concepts that are central to marketing needs to be defined or explained to adopt a working idea of what is intended to be understood. Marketing on its own does not have a definite definition. Quite a number of definitions abound which depicts the audience, media platform, occupation, school of thought and business in today's evolving and dynamic global market place and world of work. Accordingly, marketers define the concept according to what they do. Administrators, economists and other related professions define Marketing the way it suites their subject-matter and goals. Marketing according to American Marketing Association (AMA) is defined as the activity, set of institutions, and processes for creating, communicating, delivering and exchanging offerings that have value for customers, clients, partners, and society at large. Kotler, (2008), the father of Modern business Administration also defines marketing as the science and art of exploring, creating, and delivering value to satisfy the needs of a target market at a profit

7.5.2 Commodity Market

However, our concern here is on agricultural (commodity) marketing. The word market comes from the Latin word "*Marcatus*" which means merchandise or trade or place where business is conducted. The word market has been widely used to mean:

- a. a place or building where commodities are bought and sold, e.g. open market, street shop or supermarket.
- b. potential buyers and sellers of a product, e.g. rice market, goat market, fish or even vegetable market are:
 - i. the sphere within which the price determining forces operate.
 - ii. the area within which the forces of demand and supply converge to establish a single price system.
 - iii. any region (not necessarily a particular place) in which buyers and sellers are in such a free intercourse with one another that the prices of the same goods tend to equality, easily and quickly.
 - iv. a social institution which performs activities and provides facilities for exchanging commodities between buyers and sellers.
 - v. in economic sense, the term refers not to a particular location, but to a commodity or commodities and buyers and sellers who are in free intercourse with one another.

7.5.3 Focus on Agricultural Marketing

Farmers constantly produce outputs from their farms using inputs to achieve production goals. Agricultural marketing is concerned with the marketing of farm outputs as well as the farm inputs used in producing the farm output. Agricultural Marketing activities aim at the use of natural resources for human welfare. In

this sense, all primary activities of agricultural production that will lead to consumption of a given commodity create and cumulatively add up to the overall marketing value of such commodity. Series of activities involved in moving agricultural commodities and services from the point where it they were produced or provided to the point of consumption defines agricultural marketing. This is extended to involve in creation of time, place, form and possession utility. Agricultural marketing comprises all the operations, the agencies conducting them and those involved in the movement of farm-produce, raw materials and their derivatives (Thomsen, 2008) to the ultimate consumer at the appropriate time, location and price.

7.5.4 Components of an Agricultural Market

For a market to exist, certain conditions must be satisfied. These are considered not only necessary but sufficient to qualify such set up to be considered a market. In other words, these are the prerequisites of an existing market:

- a. the existence of a good, produce or commodity for transaction (physical existence is important but is not mandatory: this is because, service can be present as an intangible good).
- b. the existence of buyers and sellers (real actors).
- c. business relationship between those who are willing and able to buy (Buyers with money – effective demand) and those who have the commodity (quality goods/commodities) and are willing to sell (sellers) and;
- d. a place set aside, or region or the whole world for the marketing (exchange) activity to take place. The existence of perfect competition or uniform price is not necessary.

While our knowledge of traditional market system may have been with us for some time; the modern day market and

marketing has been re-defined by technology, social change and globalization; therefore, treatment of this concept must depict the influence on how these variables have re-defined every human institution including markets and marketing. e-commerce and Social Media for example have made great impact on marketing though they are still at their infancy in Nigeria. These technologies-driven opportunities remain largely untapped especial in the agribusiness sector, especially the rice production sub-sector. This therefore, presents a great challenge to farmers, governments and investors while also offering great opportunities for everybody. Globalization, social change and e-commerce, which is otherwise called e-markets focuses on enhancement of buying and selling with the use of information and communication technologies in a global marketplace.

A producer in Nigeria can use the Internet to sell his or her quality product to any part of the world. The question is, Where are the institutional facilities like: electricity, wharfs, roads, railways among others to facilitate these economic activities at the pace and time required by the buyers? Are producers aware of the prices of the commodities they produce at the world market schedules? What of Government legislation and their relationships with the importing countries? All these beg for answers, since the market and the marketing process are only means and not ends. A World Bank report in 2009 found that a 10.0% increase in country's broadband connectivity leads on average to 1.38% rise in its GDP. e-market expansion, therefore will be shown by a corresponding bandwidth rise.

7.5.5 Market Structure

Twelve under listed dimensions of any specified market are: location, area or coverage, time span, volume of transactions, nature of transactions, number of commodities, nature of

commodities, stage of marketing, and extent to public intervention, type of population served and accrual of marketing regime. Structure of a market conveys possible organization and dimension: this further depicts possibility of shape, size and design; this is evolved so that certain functions can be performed. From experience, a function modifies the structure, and the nature of existing structure limits the performance of functions. Rice marketing where sellers impose sanctions and place conditions for entry into such markets simply will influence actors in this specific agro-market segment. Market structure refers to the size and design of the market. Three other ways to explain the concept are:

- a. use to refer to organizational characteristics of a market, which influence the nature of competition and pricing, and affect the conduct of seller of commodity or service providers.
- b. those characteristics of a market which affect the traders' behaviour and their performance.
- c. formal organization of the functional activity of a marketing institution.

7.5.6 Why Agro-Produce Market is Different.

It is important to note that, agricultural production is a biological production process and very distinct from the other forms of production in the manufacturing sector. The unique characteristics of the agricultural sector justify why marketing of food and fibre-related materials should be treated separately. Some of the special characteristics of the agricultural sector are outlined further:

- a. highly perish ability of agricultural produce;
- b. seasonality of production;
- c. bulkiness of products;
- d. variation in quality of products;

- e. Irregular supply of agro produce;
- f. Small size of holdings and scattered production; and
- g. Need for processing before consumption.

Optimization of resource-use and output management of agricultural produce is a function of an efficient agricultural marketing. Efficient marketing system contributes to an increase in reducing post-harvest losses which are caused by inefficient processing, storage and transportation systems.

7.5.7 Agricultural Marketing and the Economy

Just like marketing of non-agro-produce, this activity in agriculture stimulates production and consumption which results in economic growth.

- a.) Development of Agro-based industries :** Industries that service the agricultural sector increases when the agricultural marketing infrastructure in a country is functional and efficient.
- b.) Price Signals:** Agricultural produce marketing if efficient, act as price signals to farmers who organize their production plans to reflect the allocative function of the price system.
- c.) Embracing and diffusion of New Technology:** Agricultural marketing encourages farmers to adopt innovations and the body of knowledge that it comes with. This leads to diffusion of technology. Nigerian farmers stand at a threshold of adopting new technologies to improve the agricultural growth.
- d. Employment :** Agricultural marketing, especially with the growth of electronic trading platforms offers endless opportunities in employment for farmers, website designers and managers, marketing personal transporters and market researchers as well as agro-based media jobs.

- e. **Improved National Income:** Overall, marketing activities are enhanced with value addition to products which has a positive implication on a Nation's economy expressed as improvement in the size of the Gross National Product and Net National Product.
- f. **Improved Standard of Living:** Agro-produce found in the marketing chain are quite competitive which leads to improvement in the quality to enable them to be patronized.
- g. **Market Expansion :** Market is widened when there is a well-organized and functional marketing system. This is because agricultural produce can be located in a very interior part of the country and brought to where they are bought and consumed. This increase in demand guarantees increase income of the farmer/producer.
- h.) **Increase in Farm Income:** The goal of every agro-entrepreneur is not only to earn an income, but to increase income margin successively. An efficient marketing system results in increase income levels of farmers since middlemen are most times technically excluded from the market value chain.
- i.) **Creation of Utility:** The satisfaction a consumer derives from the consumption of a produce or product or service is described as utility. This is consciously achieved as the result of marketing activity which could be through processing packaging or even grading. Marketing activities add value and utility to agricultural produce. One or more types of these utility classes are created as a result of marketing activity. These are form, place, time, and possession utilities.

7.5.8 Benefits of exploring and exploiting agricultural e-markets

Marketing platforms that heavily deploy modern means of communication to perform critical functions of a market are: electronic (or e-markets). Some of the benefits of e-agricultural markets are embedded in the characteristics of e-agricultural markets.

- (a) **Transforming rice marketing process:** All the actors in the rice value chain will be able to collect, analyze, store and share information for their daily decision making in their business.
- (b) **More investments are expected** to be generated through investment in building e-commodity shopping platforms and more human capacity for growth in the sector.
- (c) Efficient market already experienced in lower transaction costs, improved market co-ordination, and transparent rural markets.
- (d) Improved vertical and horizontal linkages with result in trust-based relationship between rice producers and buyers.

7.6 Marketing of Rice

Proper promotion and regular market study for rice in Nigeria are required to guarantee good performance of the rice production and marketing chain. Together with other stakeholders market information must be disseminated on time through appropriate channels. Besides the lag in rice production, much of the food produced locally is distributed under poor marketing structure which hinders the flow of resources and virtues of the industry (Ajijola, *et. al.*, 2012). Quite a number of ample opportunities in improving the fortunes of rice farmers abound but is also a primary function of improving quality management and increasing efficiency along the entire marketing chain. Usanga *et al*, (2015)

conducted research on the economic analysis of local rice value chain in Ebonyi State in 2015 planting season. Data on Paddy/Rice marketing channels show that majority (43.05%) of the value chain actors (producers, Intermediaries, wholesalers and retailers) were engaged in marketing of rice as paddy and as processed rice after harvest. Marketing of paddy/rice involves various operations such as: harvesting, warehouse services, handling, transportation and selling. Sales of rice usually channels to wholesalers, though retailers are partly engaged in buying directly from the producer. The individuals involved in activities along the chain include producers, traders (wholesaler and retailers), processors, transporters and consumers. Rice farmers usually sell their produce (paddy) to wholesalers who then resell the produce to retailers through the millers or processors, and to cross-border markets. From producers to consumers there is a direct link with intermediaries and wholesalers.

Efficiency in the rice marketing systems depends also on the system of market information flows. Almost all rice farmers and other value chain actors relied on single information source, which may not be reliable due to individuals' profit maximization strategy and intentions (Usanga *et al*, 2015).

7.6.1 Marketing Strategy for Rice

For successful rice farming, conscious plan to achieve marketing efficiency must be made. By marketing efficiency we mean movement of agricultural commodities (or services) from the farm to the consumers are the lowest cost consistent with the provision of the service that the consumers desire and able to pay. It is important to note that successful profitable rice farming also depends on how efficient the marketing takes place. As a tip, if the efficiency value is 100%, it means, the process was very efficient and maximum profit obtained. Of course, rice marketing will

concentrate on the marketable surplus, which is the quantity of rice available after meeting the requirement for family consumption, farm needs for seeds as well as social and religious payment in kind. Note, there must be proper plan of working out what the surplus (marketing) will be before marketing starts. Marketing surplus is given as:

$$MS = P - C$$

where

Ms = Marketable surplus,

P = Total production; and

C = Total requirements (family consumption, farm needs, payment to labour, social and religious requirement).

On the other hand, marketing efficiency is specified as:

$$E = V/T - 1$$

where

E = Market efficiency,

V = Value of marketed rice, and

T = Total marketing cost.

The higher the percentage (value obtained), the more efficient the process.

In order to fully benefit from marketing of rice, the basic economic problem must first be answered. These are as follows: what to be produce, for whom and how to produce?

a.) **What to Produce**

The rice farmer needs to know the kind of rice characteristics he/she will be putting out for sale. Rice characteristics include the following: the swelling capacity, nutrient content and cooking time. Rice varieties fall into long grain, medium grain or short grain appropriate quantities of each type of be bought by consumers showed be known.

- b.) How to Produce:** Farmers' location, socio-economic environment and personal goals will influence how to produce. From studies, swamp rice yield relatively higher than upland among the best-improved cultivars. The farmer has to consider if he has advantage in swamp or upland rice production; or more use of labour and less of machines or vice versa. Where rice processing infrastructures are available the farmer has a choice to either farm in the swamp or wetland areas, the farmer will have to select the one with the highest competitive and or comparative advantage.
- c.) For whom to Produce :** The farmer has to consider which segment(s) of the market s/he can reach and where each class of prospective buyer belongs; is it the very low income, medium or high income consumers. However, it has been established that demand for local rice is price inelastic; and correspondingly, demand increases with income level which makes rice marketing to be planned to achieve optimal returns on investment.

5.2 Marketing costs of rice (wholesale and retail)

An example of rice marketing costs with respect to wholesale and retail scenarios is presented in table 5. The scenarios represent the two major actors in the rice marketing value chain.

Table 7.4 : Marketing costs of wholesalers and retailers of Local (Ishiagu) rice in Ebonyi State

Cost items	Marketing costs (mean N): 100kgs of rice		
Farmers/Wholesalers	Eke Market – Ishiagu	Abakiliki Market	Cross boundary markets (Enugu, Abia, Cross River States)
Storage	-	N200	N500
Transportation	100	200	300
Loading/offloading	50	50	100
Milling costs	200	400	400
Packaging (bags)	1000	1000	1000
Levy	-	1000	1000
Watchmen	100	200	300
Reward to intermediary	1500	2000	2000
Handling costs	1000	2000	2000
Total	N3, 950	N7, 050	N7, 600
Cost/kg (Wholesaler)	N39.5	N70.5	N76.0
	N3, 950/100kg bag	N7, 050/100kg bag	N7, 600/100kg bag
Source: Usanga <i>et al</i> , 2015			
Retailers			
Transferring	N500	N1500	N2000
Merchandising costs	100	400	500
Total	600	1900	2500
Cost/kg (Retailer)	6.0	19.0	25.0
Grand Total	4,550	8950	10,100
Cost/kg (GT/100)	45.50	89.50	101
Marketing Cost/kg	45.50	89.50	412.2
Wholesale prices	N1, 000	N1, 400	N1, 700
Retail prices	N1, 200	N1, 600	N2, 100

Source: (Usanga *et al*, 2015). *GT= Grand Total

Based on Table 7.5, the mean marketing costs of wholesalers and retailers in the value chain. Summaries of marketing costs per 100 kilogrammes, a conventional weight and measures medium for local rice production were computed for the three sectors of the local rice value chain comprising wholesalers and retailers at Eke market, Ishiagu, Abakiliki market and cross-border markets (Enugu, Abia, Cross River States). Results show that, the total cost of production for farmers/wholesalers at Eke market- Ishiagu value chain actors is ₦3, 950/100kg bag, making it ₦39.5 marketing cost/kg for the wholesaler at Ishiagu; ₦7050/100kg bag, making it ₦70.50 marketing cost/kg for the wholesaler at Abakiliki; and ₦7, 600/100kg bag, making it ₦76.0 marketing cost/kg for the wholesaler at the cross-border markets of Enugu, Abia, Cross River States, respectively. Marketing costs for retailers were as follows: Ishiagu market = ₦45.50/100kg bag; Abakiliki market = ₦89.50 and cross border markets (Abia, Enugu and Cross River) = ₦412.2. This gave a corresponding cost price variations in the final wholesale and retail prices as:

Wholesale prices at Eke market, Ishiagu = ₦1,000;
 Abakiliki market = ₦1, 400; and cross-border markets = ₦1, 700.
 The retail prices also follow thus: Eke market, Ishiagu = ₦1, 200;
 Abakiliki market = ₦1, 600; and cross-border markets = ₦2, 100.
 This variation is very significant because it has direct effect to profit gained by producers. For retailers, though there is variation in terms of marketing margins and profit margins in these three market sites, is not much higher (+₦0.60) as compared to wholesalers because it was studied that the later (wholesaler) do store paddy for several months to win high market prices at low supply and higher demand. Longer storage duration of paddy results into higher profit margin to wholesalers (Usanga *et al*, 2015).

7.6.3 Net return of Rice Value per 100kg Bag of Local (Ishiagu) Rice

Net returns from local rice production in a study on economics of local (Ishiagu) rice in Ebonyi State conducted in 2014/2015 farming season was **N4, 085** (Usanga *et al*, 2015). This implies that rice production and value addition in the study area was profitable and viable. The effect of profitability to local rice value chain actors was positive since the value of production was above the value of costs incurred (**N4, 085**) (Usanga *et al*, 2015). This statistics were calculated from the average values of production costs from paddy, processing, transportation, marketing, sales and retailing. Individually, it was difficult to generalize that each farmer reached the stated amount of profit, because some may have very low and some very, high, and some average. Also, the cost of production (**N27, 915**) could be higher for some, and lower for others due to variations in input combination and total yield/hectare (Usanga *et al*, 2015). Inuwa *et al.*, (2011) also confirmed that rice production is a worthwhile investment at both processing and marketing level as evident in the net processing/marketing income in this research.

7.6.4 Tips on Rice Marketing

With a broad background of related marketing information, the following tips will be useful for any rice farmer or agro investor engaged in rice marketing. There is need to do a market research to reveal existing market channels and other competitors, behaviour of the competitors and buyers, and proportion of demand for different types of rice products. Farm location with respect to the target market, how to reach the market and customers must be considered. Storage of rice product must be decided whether within the farm environment or at some distant location in which ease of transportation have to be planned.

It is important to have a share of rice quality that should be sold to immediate location of the farm to meet their demand since this will attract little or no marketing cost. Where it is profitable to move the commodity to a distant location or market to sell for another segment of the market, this should also be done and on time. In addition, advertisement in the current farm location is necessary and this should be done taking note of the major competitors and cost of storage of the produce that is to be moved to the market. Adoption of slightly different prices for rice products will help to maximize profit, remain in the business or attract new buyers. All must be done with adequate monitoring of profit margin to avoid running into losses.

In practice, flexible price regimes should be adopted so that lower prices can bring more buyers who will be willing to pay for higher prices gradually, once their confidence in rice quality has been earned. Promotional strategies should use available social media platforms, which is cheap and wide in coverage. In doing these, adequate details of prices, locations and how the farmer and product can be reached should be supplied. The producer should remember that rice consumers will pay for value of the produce and requires purchase that is convenient and this should be included in the marketing plan. To Producers should also ensure that rice products advertised are available in the market to sustain the confidence of the buyers.

The profitability and marketing strategy for rice in Nigeria can be achieved if all hands are on deck to harness the potentials of rice that abounds in the country. From individual farmers to cooperative associations up to Governments and the private sector, research institutions and the International donor agencies should come together and explore these potentials, especially in producing and marketing local rice that research has neglected for

so long. Local rice can be crossed with improved varieties to produce hybrids that will yield and even give better quality than the presently-acclaimed varieties. Destoning of local rice, which naturally have better and higher nutritional value than its imported counterparts will add value and increase acceptability, as well as increase the market value and farmers' profitability. It is these attributes that will motivate rice producers and investors to go into rice production sustainably.

References

- Adesina, A. (2014). Farming is most Profitable in Nigeria Today. Interview Session with Channels Television. Recovered from www.channel.com/2014/08/22/rice-farming-is-most-profitable-in-nigeria-today-adesina. Recovered on 11th December, 2015.
- Aduayi, E. A., V. O. Chude, B. A. Adebuseyi and S. O. Olayiwola. (2002). Fertilizer use and management practices for crops in Nigeria, 3rd ed. Federal Ministry of Agriculture and Rural Development, Abuja, Nigeria.
- Ajijola, S. Usman, J. M. Egbetokun, O. A; Akoun, J. and Osalusi, C. S. (2012); Appraisal of Rice Production in Nigeria: A case Study of North Central States of Nigeria. *Journal of Stored Products and Postharvest Research* Volume 3 (9). Pp. 133 – 136, 8 May, 2012.
- Akande, A. (2010). An Overview of the Nigeria Rice Economy. The Nigerian Institute of Social and Economic Research (NISER) Ibadan, Nigeria.
- Erhabour, P. O. I. and O. Ojogho (2011). Demand Analysis for Rice in Nigeria. *Journal of Food Technology* Volume 9, Issue 2 Pp. 66 – 74.
- FAO (1997). Meeting the Rice Production and Consumption Demands of Nigeria with Improved Technologies Prepared by Imolehin, E. D. and A. C. Wada.
- FAO (2003) "Sustainable rice production for food security". Food and Agriculture Organization of the United Nations. 2003.

- FAO (2014) "FAOSTAT: Production-Crops, 2012 data", Food and Agriculture Organization of the United Nations, August 2014
- FAO (2014) "FAOSTAT: Production-Crops, 2012 data". Food and Agriculture Organization of the United Nations. 2014.
- FAO (2015) "World Wheat, Corn and Rice". Oklahoma State University, FAOSTAT. Archived from the original on June 10, 2015.
- FAOSTAT (2014). Faostat.fao.org (2014-10-23). Retrieved on 2015-09-04.
- Harris, David R. (1996). The Origins and Spread of Agriculture and Pastoralism in Eurasia. *Psychology Press*. p. 565.
- Heidicohen Actionable Marketing Guide:72 Marketing Definitions. Recovered from 11th December, 2015. Heidicohen.com/marketing-definitions.
- <http://usaid.gov/> recovered on 10 - 12 - 2015.
- <http://www.odo.org/>. Rice Production in Nigeria.
- Huang, Xuehui; Kurata, Nori; Wei, Xinghua; Wang, Zi-Xuan; Wang, Ahong; Zhao, Qiang; Zhao, Yan; Liu, Kunyan; et al. (2012). "A map of rice genome variation reveals the origin of cultivated rice". *Nature* **490** (7421): 497-501
- Inuwa, I. M. S., U. B. Kyiogwom, A. L. Ala; M. A. Maikasuwa and N. D. Ibrahim (2011). Profitability Analysis of Rice Processing and Marketing in Kano State Nigeria. *Nigeria Journal of Basic and Applied Science* (2011):19(2):293-298.
- Kadiri, F. A; Eze C. C. Orebiyi, J. S; Lemchi, J. I. Ohajianya, D. O. Nwaiwu, I. U. (2014). Technical Efficiency in Paddy Rice Production in Niger Delta Region of Nigeria *Global Journal of Agricultural Research*. Volume 2. Number 2. Pp 33 - 43, June, 2014. Published by European Centre for Research Training and Development UK. (www.ea-journals.org.)
- Kuldeep, S. (2006). "A Handbook of Agriculture". Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi 110012, page 818.
- Maddox, Gregory [ed.] (2006). *Sub-Saharan Africa: An Environmental History*. ABC-CLIO. p. 267.
- Molina, J.; Sikora, M.; Garud, N.; Flowers, J. M.; Rubinstein, S.; Reynolds, A.; Huang, P.; Jackson, S.; Schaal, B. A.; Bustamante, C. D.; Boyko, A. R.; Purugganan, M. D. (2011). "Molecular evidence for a single evolutionary origin of domesticated rice". *Proceedings of the National Academy of Sciences* **108** (20): 8351.

- National Research Council (1996). "African Rice". *Lost Crops of Africa: Volume I: Grains. Lost Crops of Africa 1*. National Academies Press.. Retrieved July 18, 2008.
- National Rice Development Strategy (NRDS)(2009): A Working Document Prepared for Coalition for African Rice Development, May, 2009.
- NSPFS. (2002). *Fertilizers and their use: A pocket guide for extension officers*. National Special Programme on Food Security, Abuja. Nigeria.
- Nwaobiala, C. U. and O. M. Adesope (2013): Economic Analysis of Small Holder Rice Production Systems in Ebonyi State, South East, Nigeria. *Russian Journal of Agricultural and Socio-Economic Sciences*, Number 11, Issue 23, 2013.
- Nwike, M. C. and Ugwumba, C. O. A. (2015): Profitability of Rice Production in Aguata Agricultural Zone of Anambra State Nigeria. A Profit Function Approach. *American Journal of Agricultural Service* Voluem 2, No. 2, 2015, pp. 24 – 28.
- Nwilene F.E., Oikeh S.O., Agunbiade T.A., Oladimeji O., Ajayi O., Sié M., Gregorio G.B., Togola A. and A.D. Touré (2010) *Growing lowland rice: a production handbook*. Africe Rice Center (WARDA) 2010. Retrieved 01/01/16
- Par Adiagne, Ibamba, J. Manful, Ojajayi (2015): *Historic Opportunities for Rice Growers in Nigeria* Accueil Publications, Revue Grain de sel 51, Special Issue (Magazine): Nigeria. Recovered on 10th December, 2015 from www.inter-reseaux.org.
- Raufu, M. O. (2014). Cost and Returns Analysis of Rice Production on Kwara State, Nigeria under Sawah Technology. *Advances in Agriculture and Biology* 2(2), 2014: 79-83. (www.pscipub.com/AAB).
- Rice Trade (2011): *Rice Production* Recovered from <http://www.ricetrade.com/artciles/riceproduction.htm>.
- Smith, Bruce D. (1998) *The Emergence of Agriculture*. Scientific American Library, A Division of HPHLP, New York.
- Takele, A. (2010). *Analysis of Rice Profitability and Marketing chain: The Case of Fogera Woreda, South Gondar Zone, Amhara National Regional State, Ethiopia*. Msc. Thesis Department of Agricultural Economics, School of Graduate Studies, Haramya, University, Ethiopia.

- Talhelm, T. (2014) "Large-Scale Psychological Differences Within China Explained by Rice Versus Wheat Agriculture". Retrieved October 6, 2014.
- Tashikalma, A. K.; D. Y. Giroh and V. A. Ugbeshe, V. A. (2014): Swamp Rice Production in Ogaja L.G.A. of Cross River State: An Imperative for Rice Value Chain of the Agricultural Transformation Agenda. *International Journal of Agricultural Policy and Research*. Volume 2(8)pp 281 – 287, August, 2014.
- The World Bank. (2011) "MISSING FOOD: The Case of Postharvest Grain Losses in Sub-Saharan Africa" (PDF). Retrieved, January 1 2016.
- Usanga, Udeme J. Essien, Ubon A. and Ajah. Juliet O. (2015) Economics and Profitability of Local Rice Value Chain in Ebonyi State Nigeria.
- Uwem, C. A. (2001). Economic Analysis of Wetland Farming in Akwa Ibom State of Nigeria. Bachelor of Agriculture Research Report Department of Agricultural Economics and Extension, Faculty of Agriculture, University of Uyo, Uyo.
- Vaughan, DA; Lu, B and Tomooka, N (2008). "The evolving story of rice evolution". *Plant Science* 174 (4): 394 - 408.
- Wikipedia, (2015) Rice.
- Yuan, L.P. (2010). "A Scientist's Perspective on Experience with SRI in CHINA for Raising the Yields of Super Hybrid Rice"

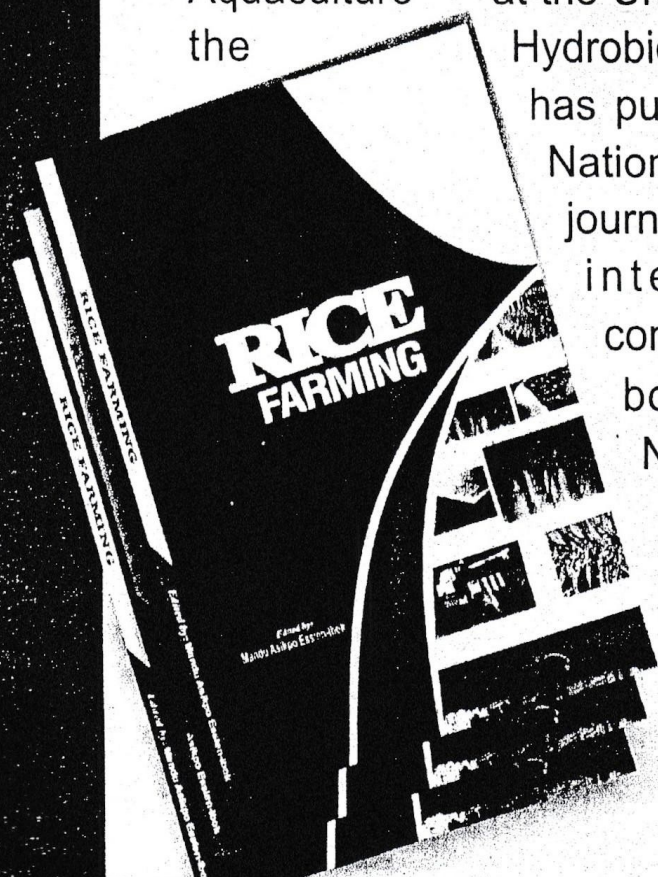
ABOUT THE BOOK

This Handbook is a compendium of modern agriculture ideas and practices scripted, taught and practicalized by Vika Farms Limited. The Authors are mainly from Universities and the Akwa Ibom State Ministry of Agriculture. The book should be of immense interest to the policy makers, academics and contemporary Nigerian Politics.

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