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Rice Production and Processing in Ogun State, Nigeria: Qualitative Insights from Farmers' Association

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ABSTRACT

This study examined the importance of indigenous institutional arrangements in rice production and processing activities in Ogun State, Nigeria through the use of Key Informant Interviews (KIIs). Analyses from the study showed that agricultural financing constitutes the greatest challenge that affects rice production and processing. Other findings from the discourse revealed that in some rice producing areas where there is the existence of rice farmers' clusters; there is access to modern rice processing machines such as winnowers, threshers and destoners. The operations of Rice Growers Association of Nigerian-RGAN in Ogun State are coordinated by the executive committee, which constitute the indigenous institutional arrangement. This study recommends that sincere and concerted efforts on the part of the government in implementing the goals of Agricultural Transformation Agenda be made to engender the welfare of rice farmers through the development of the rice value chain. The need for actively involving the rice farmers through the RGAN is also germane. The opportunities identified in the study include: the having 'pool of land' RGAN that enables the rice farmers to form clusters and increase production; creating platform through which the rice growers could leverage upon to facilitate access to inputs and technical support; gaining of visibility and market access to enhance returns on their farming endeavours.

Keywords: Agricultural transformation; Indigenous institutions; Key informant interview; Land acquisitions; Land investments; Rice production; Rice processing; Rice growers association; Value chain.

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1. INTRODUCTION

Given Nigeria's discovery of crude oil in commercial quantity, agriculture that was once the prime mover of Nigeria's economy suffered great neglect. The resultant effects include: sharp decline in agricultural production, increasing reliance on food import to meet the domestic demand, and so on. In effect, Nigeria is currently one of the largest food importers in the world with annual food import bill of about \$10 billion (Obayelu, 2015). In 2016, the quantity of local rice production in Nigeria was estimated at 4.8 million tonnes (Food and Agricultural

Organization-FAO, 2016). This further conforms to an earlier assertion by Ogunsumi, Ajayi, Amire and Williams (2013) on the gap between local demand and supply of rice in Nigeria. The author stressed that the level of rice consumption in Nigeria increases with about 10 percent per annum as a result of changing consumer preferences amidst other factors. The low productivity of rice farmers is occasioned by the use of low technologically empowered agricultural equipment which do not support large scale production. For instance, Fasoyiro and Yaiwo (2012)ⁱ observed that in Nigeria, rice is mainly produced by small-scale farmers whose production are characterised by low output resulting from production inefficiency, aging farming population, low technological know-how, and so on. In the same vein Uduma, Samson and Mure (2016) noted that the inability of local supply to meet up with rice demand (consumption) has given rise to the high import of rice in Nigeria. According there has been a phenomenal rise in imports of 300 thousand tons annually in recent times which on the average with an estimated cost of 300 million naira annually in foreign reserves. They further stressed that aside from the huge cost to the Nigerian economy, rice imports exposes the country to international market shocks with its associated risk implications on food security.

This is contrary to what obtained a foretime where Nigeria used to be the largest producer of a number of crops including rice in West Africa (Okoruwa, Jabbar & Akinwumi, 1996; Obayelu, 2015). However, in 2010 there was somewhat re-awakening in the agricultural sector with the launch of the Agricultural Transformation Agenda (ATA). The ATA was part of the Federal Government of Nigeria's (FGN) effort to revamp the sector in order to enhance food security, job creation and diversification of the economy (Osabuohien, 2014; Obayelu, 2015; Osabuohien, 2016). The transformation agenda as enshrined in ATA is set to create over 3.5 million jobs from rice, cassava, sorghum and cotton value chains, with more jobs to come from other value chains when fully implemented. Generally, ATA, among others, has the goal of re-defining agriculture as a business by promoting the involvement of private sectors, encouraging the expansion of private sector driven marketing organisations, and promoting incentive-based risk sharing for agricultural credits (Osabuohien, 2016; Okodua, 2017; Osabohien, Osabuohien & Urhie, 2017).

Rice is one of the crops being considered under the FGN's ATA given its growing importance and prominent role among staple food crops in Nigeria. The country has a history of indigenous rice production and high demand (Johnson, Takeshima, & Gyimah-Brempong, 2013). Thus, it is not surprising that rice has emerged as a major staple food crop in Nigeria, given its demand in all the six geopolitical zones, 36 States, all the Local Governments, and across all socio-demographic groups (Gyimah-Brempong, Johnson & Takeshima, 2016). The increasing domestic demand for rice in Nigeria has been attributed to consumer preferences, increasing incomes, rising urban population, among others (Nwanze *et al.*, 2006).

In response to the above challenges, the FGN's policy on agriculture detailed in ATA offers some new incentives with a view to encouraging domestic import substitution in agriculture especially rice production. Some of the efforts include: encouraging private sector investment in agriculture through the removal of restrictions on areas of investment and maximum equity ownership in investment by foreign investors; free transfer of capital, profits and dividends (that is, no currency exchange controls); guarantees against investment expropriation; total removal of import duty on agricultural machineries and tax holiday for agricultural investments (Adesina, 2012; Okodua, 2017)ⁱⁱ. The above highlighted incentives have resulted in private investors

coming into the production of rice in Nigeria. Some of them include: Flour Mills of Nigeria, Bidda-Badeggi, Niger State; Ebony Rice, Ikwo, Ebonyi State; and Dominion Farms, Gassol, Taraba State (Okodua, 2017). A closely related development is the Memorandum of Understanding (MoU) between Dangote Industries Limited and the FGN worth US\$1 billion investment in commercial rice farming and modern integrated rice mills, which was signed in August 2014. It is reported that farmlands have been acquired in Edo, Jigawa, Kebbi, Kwara, and Niger States with acreage of about 150,000 hectares as well as the proposed establishment of two large-scale rice mills with capacity of 240,000 metric tons of rice paddy (Okodua, 2017). These private and government participations are expected to encourage local content and value chain development. This will further improve foreign exchange position by reducing of the importation of finished food products such as rice, which is a significant component food imports.

It is based on the foregoing that this study assessed the rice production and processing in Nigeria using Ogun State which is one of the major rice producing States in the country. The methodological approach adopted in achieving this objective is the qualitative technique using Key Informant Interviews (KIIs). The next section briefly discusses rice development in Africa and Nigeria while the information on Ogun State and the Local Government Areas where rice is produced are contained in the Third Section. The theoretical framework is encapsulated in Section four; while Section five contains the level of rice production, traditional versus modern rice processing as well as the constraints to rice production and processing. The last section contains the conclusion and recommendations made from the study.

2. BACKGROUND

2.1 Rice Development in Africa

The major engine for growth in Africa has been Agriculture. However, since majority of the African farmers practice subsistence or small holders farming characterised by low skilled labour force and family units, there is a high incidence of yield gaps, in addition to poor soils and other obstacles to sustainable farming incomes (Gyimah-Brempong, Johnson & Takeshima, 2016). Harold and Tabo (2015) also noted that rice is the single most important source of dietary energy in West Africa and third most important for Africa as a whole. It is evident from the study that despite the increased in local rice production there is still the persistence of the shortage of local production compared to the excess demand for the commodity (Harold & Tabo, 2015; Gyimah-Brempong, Johnson & Takeshima, 2016).

With the fast growing population and the rising food demand, it is important that African continent graduates from the level of food shortage to food surplus. This could be realised by making the challenges confronting the agricultural sector a major priority which must be vigorously and earnestly resolved through strong determination from the political class, exhibiting the right mind set towards agriculture by the private and government bodies and incorporation of youth and women in agriculture. Through this platform the Africa rice framework for Africa's Agricultural Transformation Agenda could be adequately embraced and implemented in various states, agricultural establishments and agencies (Harold & Tabo, 2015).

In previous years efforts have been made by African countries to reposition rice production. For instance, one of the major outcomes of the 'Abuja Food Security Summit' by the African Union in 2006 was the conferment of "region-wide strategic commodity" to rice status. Whilst this

confirms the important position of rice in the agricultural sector, it also creates opportunities for positioning it as an important commodity in the secondary and tertiary agricultural sectors (Harold & Tabo, 2015). Rice is, therefore, a priority crop in the implementation of the New Partnership for Africa's Development-NEPAD and Comprehensive Africa Agriculture Development Programme-CAADP (Harold & Tabo, 2015). Consequently, Senegal had launched a national programme for rice self-sufficiency with the objective of increasing production from 215,000 tonnes in 2007 to 1.5 million tonnes of paddy in 2015. Similarly, Mali has started an extensive rice-promotion programme aimed at increasing production by 50% in a cropping season in 2009ⁱⁱⁱ. Other African countries (such as Cameroon, Ghana, Kenya, Madagascar, Mali, Mozambique, Nigeria, Senegal, Sierra Leone, Tanzania and Uganda) under the umbrella of the Coalition for African Rice Development (CARD) have introduced National Rice Development strategies (NRDS). This programme is aimed to double Africa rice production by 2018 compared to the level of production as at 2008 (Harold & Tabo, 2015).

2.2 Rice Sector Development in Nigeria

The Nigerian government is not left out as it has pursued and implemented various agricultural policies at the State and Federal levels on the rice transformation agenda to boost Nigeria's rice production over the years. Among these is the Agricultural transformation agenda (ATA) with the success recorded in local rice production of 4.8 million tonnes per annum (FAO, 2016). Harold and Tabo (2015) further noted that similar rice-sector promotion programs have been embarked upon in other African countries like Ghana and Côte d'Ivoire. These align with the ECOWAS Agricultural Policy-ECOWAP (Olayiwola *et al.*, 2015). Given the rise in food consumption (rice inclusive), some have argued that the production of rice in large quantities (that is, large-scale) should be considered as one of the major ways of ensuring food security for the teeming population in Nigeria (Herrmann, Jumbe, Bruentrup and Osabuohien, 2017; Osabohien, Osabuohien & Urhie, 2017). Others hold contrary view, stressing the need to empower small-holder farmers. Against that backdrop, Juliano (2016) stated the importance of rice over other crops, in terms of its total production in the developing countries and the number of consumers that are dependent on it as a staple food. This has also been stressed by Gyimah-Brempong, Johnson and Takeshima (2016). While Umeh, Joshi and Ukwungwu (1992) discussed that a holistic, broadly based, multidisciplinary pest-management research approach is required due to the immense benefits that integrated pest management (IPM) can provide.

Another important aspect of rice production that requires attention is the issue of technological advancement in rice processing since it has been observed that most of the processes utilised by the rural rice farmers are mostly traditional that are both labour intensive and time consuming. With higher level of technology, the farmers will be able to achieve a higher volume of yield with the best quality of products that will enhance consumer preference for locally produced rice. Technological advancement in the production and harvesting will promote commercialization and profitability of the rice production. Application of modern technology in the production and processing will further guarantee a better packaging of local rice to make it more appealing to consumers and will attract more buyers of the product. The use of modern harvesters suitable to our own ecology will further enhance the standard of the rice production process by reducing the rate of breaking and eliminating contamination by stone and shafts. Kareem (2016) has pointed out that the major obstacle facing the attainment of the potential benefits of agricultural production in many African countries is inadequate science and technological advancement.

Adewumi, Olayanju and Adewuyi (2007) observed that rice production and processing are profitable ventures in Nigeria and what is required is to encourage investment in rice processing activities. Aside the nutritional value of rice and high inclination of people towards its consumption, the by-product of rice could serve as a source of energy generation for domestic purposes. This could serve as a source of biofuel for cooking especially in rural settings where most of the rural dwellers could not readily afford the cost of kerosene or gas for cooking and heating purposes. Yan, Ngadi and Kok (2016) in their study stressed that rice generates large amount of by-products that could be used to produce energy and reduce the amount of firewood required to meet the daily cooking needs. This is crucial in Nigeria where rural dwellers use local means of cooking such as firewood and charcoal. The connotation of the above is that modern processing of rice at the milling centres could help in preserving the rice hub which servers as firewood to the locality thereby reducing the cost of buying kerosene for cooking.

For optimum output to be attained in rice production, it is necessary that ecological consideration be factored in the production process, especially in the choice of land as well as the typological components of the area. In this respect, the method of land preparation plays a significant role in the rice production process. In relation to this, Amb and Ahluwalia (2016) observed that zero tillage in rice-wheat cropping system could have major benefits, such as: improved water usage efficiency, reduced investment cost, higher yield, reduced weed population and a positive environmental effect. In production system with no-tillage or conservation tillage, the crop residues are buried in the soil and thus, the release of *allelochemicals* from both the growing plants and residue decomposition might act synergistically. This is because rice fields have versatile *ecotones* that comprise aquatic habitats as well as dry lands and a large group of biodiversity. Other significant factors that affect rice production include: weeds and pests and diseases infestations. Thus, the control method employed in the rice farm and the timing of the weeding is of essence to prevent its devastating effects in the rice farm development.

3. Rice Producing Local Government Areas in Ogun State.

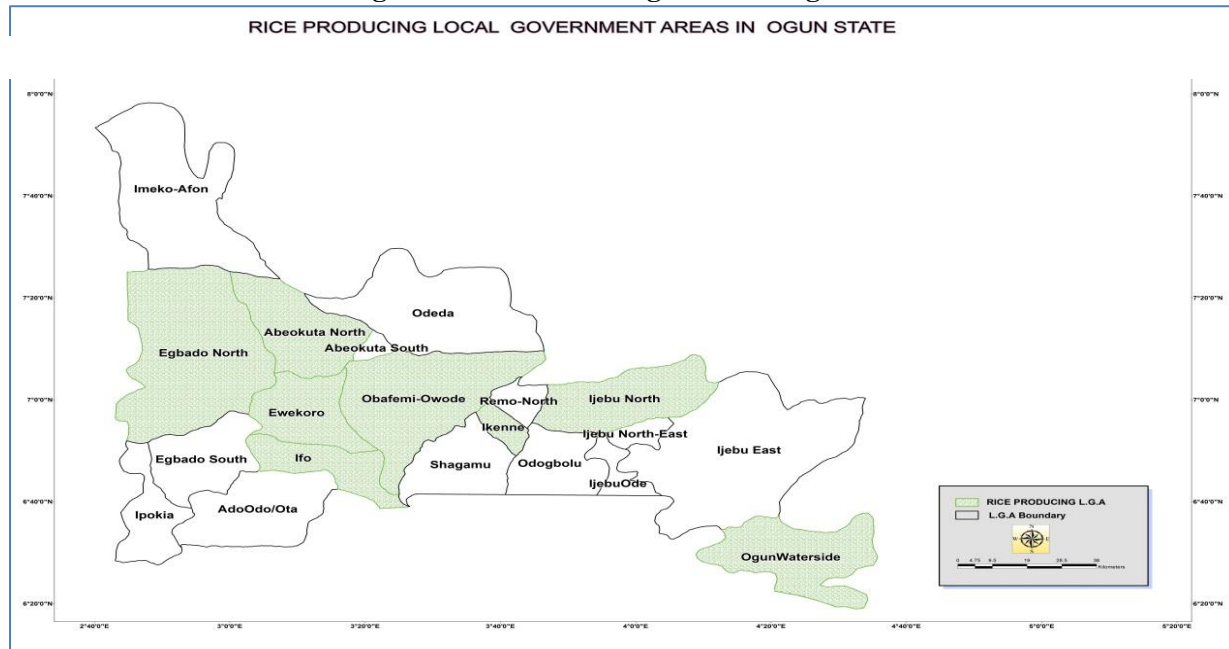
The focus of this study is on Ogun State, Nigeria where a number of Local Government Areas (LGAs) engage in rice production. Ogun State, created 3rd January 1976, is one of the 36 States in Nigeria, located in South-West Geopolitical Zone. It is bordered by Lagos State to the south, Oyo and Osun States to the north, Ondo State to the east and the Republic of Benin to the west. The map of Ogun State highlighting the rice producing local government areas (LGAs) is depicted in Figure 1. Abeokuta is the capital and the largest city in the State. Besides Abeokuta, other popular cities and towns in Ogun State are: Ijebu Ode, Sagamu, Ijebu Igbo, Ilaro Ayetoro, and Ota.

With regards to agricultural activities in Ogun State, available statistics indicate that the population of the people living in the rural areas, where most of the agricultural engagements take place is approximately 3 million. The number of farming households is about 360,000 persons, which comprises an average family size of 4.8 persons. The total arable land in Ogun State stands at 1,204,000 hectares representing nearly 74 percent of her total land area. Out of the above total arable land, about 350,000 hectares is presently cultivated, which constitutes 29.07 percent of arable land area. The general vegetation cover comprises: rain forest, swamp forest and derived savannah (Ogun State Government-OSG, 2016). The weather and climatic conditions typically follow the tropical pattern with rainy or wet season starting in March and

runs till November, which is immediately followed by dry season from December to February. The annual average rainfall ranges between 105 cm (in the northern part of the State) and 128 cm (in the southern areas of the State). Thus, it is not unexpected that the major crops grown in the State include the following: cashew, cassava, citrus species, cocoa, yam, coco-yam, cotton, kola nut, maize, oil palm, pineapple, rice, rubber, sugar cane, and vegetables. They form the main stable food as well as provide raw materials for food processing industries (OSG, 2016; Osabohien *et al.*, 2017).

As depicted in Figure 1, eight out of the 20 LGAs in Ogun State, representing 40 percent, are involved in rice production. These LGAs include: Abeokuta North, Egbado North, Ewekoro, Ifo, Ijebu-North, Ikenne, Obafemi Owode, and Ogun Waterside. In some of these LGAs, there has been the establishment of rice mill that is possibly expected to make Ogun State a major player in rice sector *revolution* in Nigeria in the nearest future, *ceteris paribus*.

Figure 1: Rice Producing LGAs in Ogun State



Source: The Authors'

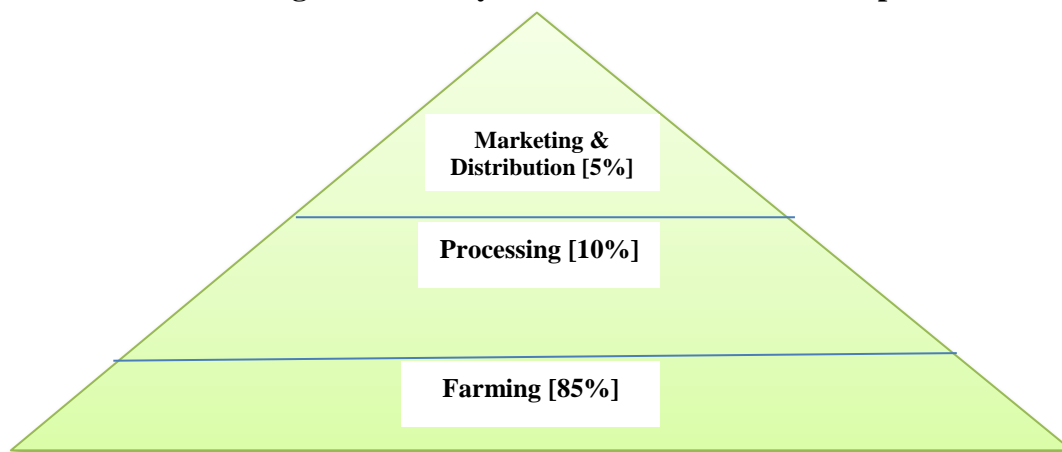
4. THE THEORETICAL FRAMEWORK - RGAN

This study follows a conceptual framework that is built on the theory of New Institutional Economics (NIE) where the role of institutions is considered essential in economic activities and relationships involving economic agents. In general terms, institutions can be formal and informal. While the formal institutions entail well-documented principles that guide and guard the affairs of economic actors in a society, the informal (also called traditional, local or indigenous) institutions comprise moral codes, values, norms and conducts (usually unwritten) that influence the way people or group of persons (for instance a community or an association) are coordinated or organised (North, 2005; Osabuohien & Efobi, 2013; Osabuohien, 2014). In this context, the indigenous institutions comprise the community leaders who can act on behalf

of the members of the communities. The community and/or association leadership is taken as the custodian of the customs, beliefs, norms and values in such communities and association.

Following the approach of local institutional framework as articulated for Nigeria (Osabuohien, 2014) and for Uganda (Osabuohien, Efobi, Gitau & Bruentrup, 2015), this study examines the operations of a typical agricultural association (Rice Growers Association of Nigeria (RGAN) in Ogun State), which makes it quite unique unlike the general concept of non-governmental organisations (NGOs). Osabuohien (2014) enunciates how the existence of NGOs can influence or not the likelihood of Large-Scale Agricultural Land Investments (LALIs) in Nigerian communities. Whereas Osabuohien *et al.* (2015) expounds the case of Uganda to investigate how NGOs can affect the possibility of land investments taking place in a community as well as how such land investments influence the level of community's amenities notably: road, health, education and water provision. Thus, this study extends the frontier of institutions-land investment nexus by exploring how RGAN as an informal institution can influence the activities of the members with respect to rice production and processing using the case of Ogun State, Nigeria.

Figure 2: The Pyramid of RGAN Membership



Source: The Authors'

From the foregoing, RGAN can be seen as an informal (local, traditional or indigenous) institutions that is distinct as it agglomerates individuals that are connected directly to rice value chain ranging from production, processing, distribution and marketing of rice (paddy and processed). In effect, the RGAN^{iv} membership is opened to interested individuals that are involved in: a) rice farming; b) rice processing; and c) rice marketing to distribution as shown in Figure 2. RGAN was established in Ogun State in the year 2000, and as at May, 2016, it has grown to a membership of about 5000. Though membership is voluntary to all of the three aforementioned categories, members usually contribute the sum of Two Thousand Naira (₦2,000) per annum as membership due (levy) to help in running the affairs of the association as well as maintaining their membership status.

The operations of RGAN in Ogun State are overseen by an executive committee made up of nine persons including the Chairperson, Vice Chairperson and Secretary. The Chairperson was very instrumental in establishing RGAN in Ogun State (and is presently the National Deputy

Chairperson South of RGAN). He has held the office since its inception and he will join the league of Octogenarian before the end of 2016. He devotes his Wednesdays (at times in conjunction with other executive members) to attend to members who come to see him at his residence located in Obafemi Owode LGA of Ogun State. Apart from having rice farms, few of the members have rice processing machines, such as: thresher, winnower and destoner.

The average farm size of the members is about 2 hectares. Thus, connoting that rice farming Ogun State is dominated by small-scale farmers. Based on needs and discussions with the members, the leadership of RGAN also raises issues of common interest to the government usually through Agricultural Development Programme (ADP) and the Ministry of Agriculture, which is the organ of the government that helps in coordinating policies that are related to food and agriculture (OSG, 2016). As shown in Figure 2, majority of the members of RGAN are into rice cultivation while the least are in marketing and distribution. A number of those in rice cultivation are also into processing, though many use traditional processing methods. In sum, there are far more members in the farming level, followed by processing and then those in marketing and distribution.

5. RICE PRODUCTION AND PROCESSING IN OGUN STATE

5.1 Status of Rice Production

In recent times, rice has been identified as one of the six major cash crops that Ogun State has comparative advantage in producing, and therefore has started drawing attention. The other cash crops apart from rice are: cassava, cocoa, cotton, kola-nut, and oil palm. In spite of the preparation and adoption of Ogun State's document on cash crop policy, there have not been significant improvements in the level of rice production in the State. Current estimates suggest that Ogun State's rice output revolves between 15,000 and 20,000 tons per annum. The area under cultivation is about 12,000 hectares which accounts for a share of 0.7% of national area cultivated to rice (Onabanjo, 2011).

From the interview conducted, it was observed that some of the rice farmers come together to form clusters with a view to creating a kind of self-assistance and boost their production level. Each farmer within these rice farmers' clusters usually cultivates an average of 2 hectares of farmland per planting season. The major reason behind this idea is traceable to the capital intensive nature of cultivating large hectares of rice farm which is beyond the reach of many small-scale farmers. Hence, they make effort to pool resources such as renting tractors together to during land preparation. Some of the respondents were of the opinion that the replication of such rice farmers clusters in different communities within the State will increase the level of rice production. For instance, a farmer needs a total of about 10 workers per hectare to work during the process of rice production, harvesting and processing. According to the Deputy National Chairperson of RGAN, there is very low availability of farming labour resulting to high labour cost and aging farming population. The reasons are not far-fetched, the process is both unattractive to the youth and there is low level of '*tractorisation*'. This is worsened by the fact that the method of rice production by the peasant farmers is labour intensive and characterised by drudgery.

The above necessitates the essence of embarking on a research of this nature, given the vast amount of resources and opportunities Ogun State has for rice production. These opportunities

include: huge ready market for rice paddy; growing market for *OFADA* rice, available land for lowland rice cultivation; availability of land for expansion of upland rice cultivation; rich human resource; high yielding rice varieties; and increasing numbers of agricultural service providers. In addition, it has been emphasised that the establishment of the *Ofada/Veetee* rice mill in Itori, Ogun State can strategically position the State as a major player in rice production. With an installed capacity of 75,000 tons per annum, it is expected to expand up to 200,000 tons per annum at full capacity, which will substantially boost the market for paddy rice in Ogun State. This has the potential of increasing food supply, income of the farmers, employment as well as reducing Nigeria's high demand for foreign exchange, strengthening of her currency, and reducing inflation, and so on (Onabanjo, 2011; OSG, 2016).

Rice can be said to be an increasingly important crop in Ogun State (as in other rice producing States such as: Ebonyi, Osun and Niger) as it has become part of the staple food items that people consume as daily diet.

In some areas (e.g. *Ofada*^v village in Obafemi Owode LGA) of Ogun State, there is a long tradition of rice cultivation. Regarding the rice varieties grown in Ogun State, some of them are considered traditional varieties, others are recently introduced two decades ago usually grown in paddies or on upland fields, depending on the particular variety. It has also been reported that, in the last 20 years, new varieties of rice are produced and disseminated by research institutes, or imported from Asian countries -. Consumption of *Ofada* rice has gained more prominence possibly due to the health awareness of many Nigerians who relate its taste and natural flavour, higher nutritive value to the significance on their health compared to imported rice varieties. The *Ofada* rice variety has been reported to have higher fibre content and better health consideration. Consequently, it now attracts high market price given its relative scarcity compared to other rice varieties including the imported ones.

5.2 Traditional versus Modern Rice Processing^{vi}

Generally, the paddies of the rice plant are first milled to remove the chaff by subjecting it to steam or parboiling. Raw untreated rice may be ground into flour for many uses such as making of beverages (alcoholic or non-alcoholic), rice flour noodles and food items (*tuwo*). Processed rice seeds may be boiled, steamed or further fried in cooking oil before eating. When combined with milk, sugar, and honey, it is used to make rice desserts. Rice flour and starch are often used in batters and breading to increase crispiness (Ogunsumi *et al.*, 2013). Thus, there are opportunities for value chain in rice production in Ogun State which can lead to job creation and enhanced income for households. There is also the possibility of attracting new industries that will specialise in the processing of rice into different forms suitable for variety of finished products. In addition, through these feeder industries there will be more rice products that will create its own demand and thereby increasing demand for rice.

The traditional methods of processing rice paddy involve: soaking of the paddy in water for 2-3 days; steaming of the soaked paddy for 5–10 minutes and dried in the sun; pounding the dried paddy in a mortar and pestle to remove the husk or use of simple milling machines; then the grain is cleaned using a winnowing basket (Ajala & Gana, 2015). The traditional method of rice processing is simple, but it is tedious, leads to breakage of rice kernels and incomplete removal of husks, and has short storage life. In modern methods, the rice is first cleaned to remove

contaminants, and the husks are then removed by a machine called shellers. The shellers are commonly horizontal spaced rotating abrasive stones, but increasing use is being made of rubber roll or rubber belt. The rice and hulls are separated by aspiration and any paddy remaining with the rice is removed in a paddy separator.

The main problem of Nigerian rice (especially those processed through traditional method) is the presence of stones in the rice grains. The responses from the interview conducted with the rice farmers revealed the major sources of the stones were traditional process such as harvesting, sun-drying, and so on. It starts with the parking of paddy rice from the ground after harvesting; then through sun-drying of the paddy after parboiling where the paddy is spread over a mat (or detached sack) on the ground; and parking of the paddy after it has been sun-dried, where some of the paddy that falls off are inadvertently parked together with the pebbles (stones). In some cases, there are perforations in the mat which allows stone penetration and mix-up with the paddy. In the words of the farmers, ‘stones do not grow with the rice; it is the weakness of humans in harvesting and processing that introduces the stones’.

In Ogun State, modern stone removal machines (known as destoner as shown in Figure A3 in the Appendix) are located in places like Moloku Asipa in Obafemi Owode LGA, Ijebu, Imuwe, Ago Ijebu, Kobape, Obada-Oko, Ifo, Lafenwa and Iboru, as revealed during KII with the farmers. Whereas the older version of the machine can destone at the capacity of less than 1 ton per day, the modern destoner has the capacity of 2 tons per day equivalent to 250 kg per hour. The modern machines are located where there are cluster of rice farmers in large numbers with a view to having regular patronage. There are slight variations in the machines as it was reported that the type of machine located within a specific area should be compatible with the type of grains produced in that locality.

Another improvement in rice processing in Nigeria is the drying process where the traditional sun-drying can be replaced by mechanical dryer, which can process about 3 tons and remove 50 percent moisture of rice in six hours. However, there is still some demand for the locally processed rice as the farmers interviewed stated that the soaking of paddy rice can be optimal at 4 days, which brings out the aroma (*odour*) that makes the *Ofada* variety unique in the market. One of the RGAN members who is involved in rice farming and processing recalled an event when the paddy was soaked for only 2 days and the resultant effect was shocking: ‘one of the distributors returned some bags of 50kg rice on the account that the consumers rejected them because they did not have the usual aroma’.

5.3 Major Constraints to Rice Production and Processing

This section presents the summary of the key challenges facing rice production and processing in Ogun State. They are numbered according to the severity as identified by the respondents. Some suggestions on how to ameliorate them are also provided.

a. Financial Constraint

The challenges encountered by farmers in rice production cuts across the value chain. However, the most outstanding challenge was finance for rice farming. In every segment of the rice production process, it has been observed that finance played a significant role in the development of rice processing in Ogun State. Majority of the rice farmers are aged above 50 years and they

serve as the major source of labour as most of the young working population prefer white collar jobs. Consequently, the cost of farm labour has become very expensive making it very difficult for an individual farmer to hire. Hence, before any farmer can carry out rice production beyond the subsistence level, there will be a need for financial support from the government, private investors, individuals, agric-scientist and non-governmental organisations (NGOs). For instance, the government could assist the farmers by procuring group of interested farmers at reduced cost to facilitate farm mechanisation and commercial production. Thus, clusters of rice farmers could afford to hire these tractors to clear large hectares of land

In line with the above insights, our respondents affirm that inadequate finance constitutes the major challenge in rice production in Ogun State. It was further explained thus:

Finance in the sense that if you want to farm on your own, you need a lot of money that is why we are calling on government to get us cluster areas. To develop a large expanse of farmland and distribute to farmers, lets us have clusters, like the value chain now, they are developing a cluster at *Onidundu* where they will clear about 80 hectares for farmers and distribute to the farmers. All other production processes will be easier.

b. Land Development Related Challenges

The problem of land development arises because most of the farmlands for rice cultivation are usually located in rainforest, especially areas that have not been used for rice cultivation previously. Given the nature of vegetation, intended lands for rice cultivation will require a great number of labour inputs to clear a large expanse of land particularly when it is not mechanised. However, to effectively clear such a forest zones for rice cultivation, there will be need to hire tractors which could be highly exorbitant; hence, may not be within the reach of an average rice farmer. Apart from the challenge in hiring tractors, the interview revealed that rice seed germinates within the topsoil where the rice roots absorbs soil nutrients; hence, most of the nutrients needed for rice growth are supplied from the surface soil. This further entails that the tractor operation during land preparation should be carried out with some care with a view not to removing the surface soil that houses the essential nutrients, which is crucial for effective rice production. However, it is observed that there are instances whereby the soil nutrients are eroded from the surface soil during tractor operation in the land preparation process which eventually affects the supply of nutrients to the crops. In addition to the constraint of hiring tractors and erosion of the surface soil during land preparation, there are other challenges such as accessibility of land for commercial production.

c. Input challenges

The farm inputs refer to availability of farm raw materials required for the rice production. Most important in this aspect is the ability of the farmers to have access to the right variety of rice seed that is suitable for that particular ecology. Secondly the issue of genuine herbicides for effective treatment of weeds is a real challenge at the rice production stage. This owes to the fact that some of the herbicides are now becoming adulterated. This makes it difficult to distinguish between the original and fake herbicides. To access new improved varieties that are suitable for a particular ecology requires a huge sum of money which could highly expensive for an average farmer to afford. However, the government is yet to meet up with the demand of procuring these varieties and making it available to the farmers at subsidised rate as a means assisting the

local farmers in boosting rice production in Ogun State. This invariably do not encourage more farmers and the teaming unemployed labour force to go into rice production. This therefore reduces the opportunities for more employment in the real sector economy.

Furthermore, the KIIs conducted show that the adulteration of herbicides constitutes a serious problem in rice production. “It could have been easier, if we had genuine herbicides, the adulteration of herbicides is another problem”, one of the interviewees added. This implicates that when the herbicides are adulterated, the effectiveness of the chemical in killing weeds is reduced such that the farmers after spending their resources in purchasing the herbicides will not even realise the objective of using them. The aftermath is increased cost of production and consequently affects the profitability of the rice farmers adversely coupled with the laborious nature of rice production process.

Other major reasons for insufficient domestic production of rice include: inadequate and untimely availability of necessary inputs, cost of reducing rice production constraints, and cost of adopting proven technologies. Though various governments in Nigeria have tried to improve the domestic production base of rice, there has not been enough incentives for farmers to increase their production. Other challenges revolve around land fragmentation and reliance on crude agricultural equipment. The method of rice cultivation and harvesting mostly relied on labour intensive approach at the subsistence level in addition to low level of Agricultural extension agencies.

d. Un-mechanised Rice Production Processes (*Low Tractorisation*)

Most of the production processes that are connected to rice production in Ogun State still make use of traditional method approach. The process starting from land cultivation to harvesting and processing are mostly done with manual labour, thus making the production process labour intensive. From KII, it was learnt that on the average a farmer needs a total of 10 workers to work on a hectare of land from cultivation to the harvesting stage. Despite the fact that some of these farm workers are family members, the cost of hiring farm labourers poses a significant constraint to rice production in Ogun State. The labour intensive method of rice farming is not only tedious, but time consuming and at the end the farmers only produce at the subsistence levels and in few cases where there is excess it is sold at the local markets. The un-mechanised method (which is also referred to as no or low *tractorisation*) of rice production does not allow for production in commercial quantities that could be harvested, processed and marketed to reach wider consumers.

Furthermore, there is unavailability of farm labour due to competing sectors which employs greater number of the young population such that agricultural business is becoming more and more uninteresting to the teaming young population of the labour force in Ogun State. In a nutshell, the leadership of RGAN are of the opinion that when they have requisite supports from the government agencies such as their counterparts in Indian States, they will not only able to meet with domestic demand, they can have supply for export. This Indian analogue is apt because, the *Ofada* variety of rice in Ogun State is likened to the basmati rice of India in terms of characteristics and nutrient content.

e. Birds Infestation

Another major challenge associated with the production stage as highlighted in the fieldwork is the issue of bird infestation, which is problematic at the period of maturity of the rice grains in the field. The farmers interviewed explained that rice farmers need to scare the birds for at least 30 days prior to maturity of the rice grains. The challenging aspect of it is that the farmer or the person employed for this job will have to be in the farm early in the morning (about 6.00 am before the birds wake up) to stay on the farm till in the evening (around 7.00 pm after the birds have gone to sleep). In other words, the farmer has to be in the farm before the waking up of the birds and remain there till evening when the birds go to sleep with routine process of blowing whistle or beating a kind of drum to raise sufficient noise that will drive away the birds. In effect, for a hectare of rice farm, the farmer needs at least two persons to effectively combat the bird infestation challenge, which has huge cost implication. This step is normally taken as a proactive measure to stop the birds from feeding the maturing rice grains while in the field. Without this step, the farmer is bound to incur losses and low output because great proportion of the rice harvest would have been eaten up by the birds while in the field.

f. Labour Intensive Harvesting and Threshing Process

In this part of the country we were meant to understand that harvesting of the paddy rice is done by pinnace and by straw. This process basically involves the use of manual labour and is time consuming. The major reason is that *Ofada* rice which is predominantly grown within Ogun State lodges more than any other variety due to its weight. Therefore, harvesting by straw which could be done with machine is not suitable for this variety of rice. When harvesting is done using straw, many of the rice paddies are shattered at the point of harvesting because of the lodging nature of *Ofada* rice. Hence, the farmers call on agricultural engineers in Nigeria to develop a unique harvester that will be suitable for the type of rice produced within the ecology of the State.

The above lends support to Adewumi, Olayanju and Adewuyi (2007) who worked on rice threshing cluster in *Ofada*, Abakaliki, Markudi and Kano. Their study revealed that the structure of farm size used for rice production by 80% of the farmers ranges from 1-10 hectares of the rice farm holding, 15% of the farmers cultivated between 11-20 hectares while only 5 percent of the rice farmers have access to 21-30 hectares of land. The average farm size cultivated by the rice farmers was 3 hectares. This indicates the low proportion of land currently used by the local farmers for subsistence farming rather than for commercial and export purposes. However, the mechanisation of the rice threshing will to a large extent enhance rice production in Ogun State and enable the farmers to produce high quality rice that is globally acceptable. The traditional method of threshing increases the chances of harbouring dirt and contamination with stones, which adversely affect the perception, acceptability and marketability of the locally processed rice. This scenario does not only affect production and revenue from rice farming but also encourages over reliance on imported rice for local consumption as has been the case in Nigeria for many decades.

g. Limited Modern Processing Machines

This modern processing machine involves the use of equipment such as modern harvesters, modern milling machines to remove the shaves from the paddy rice, winnowing machines that will facilitate the removal and blowing of the chaffs from the milled rice and destoner machines for removal of stones from the processed rice. Also instead of sun drying the parboiled rice

which takes considerable length of time especially during the rainy season farmers can employ the use of modern machine called driers that dry the rice grains within a shorter period of time. Traditionally some farmers make use of their house ceilings made of improved materials such as bamboos, rafters and iron roofing sheets to dry rice due to the heat they generate as a result of the sun's rays. As noted from our interview with the farmers some rice farmers winnow with baskets which does not allow for complete separation of the processed rice from the chaffs. Also the outdated destoner can still be found in some places like *Ifo*, *Lafenwa*, *Siun* and *Owode*. The basic source of energy for powering the parboiled rice is basically firewood. Conversely, there are other modern method that could be used such as electricity and solar energy trapping equipment.

Another major processing challenge has to deal with water supply. In some of the areas where rice is processed the nearest source of water supply is about 4 kilometres away from the point of processing. So the farmers will either dig bore holes or install big tanks for water storage and this is capital intensive. The need for water supply arises particularly with the nature of variety of rice produced within Ogun State which *Ofada* rice in which case the farmer need to soak for 4 days to complete a process and another process begins. Before the beginning of another process of soaking it is expected that the farmer replace the old water with a new one to avoid unnecessary odour. The soaking of the *Ofada* rice for 4 days is done to bring out the aroma and taste that make it unique among other varieties.

h. Weak Linkages for Marketing of Rice Products

The issue of linkages relates with the marketing and distribution networks challenges. There is need to link the rice farmers with the markets for demands of their produce. In our interview with the farmers we discovered that price of the rice products do not reflect their real value. In this case, the farmers are at a loss. This occurs in instances where the produced and packaged rice is being sold below the real value probably because the farmers are in dire need of cash to solve some other problems and will have no other option than to sell the rice at a price which is below what it would have been sold under normal circumstances.

6. CONCLUSION AND RECOMMENDATIONS

Government in recent times have realised the need to focus more attention in the production of the cereal crops more especially on rice and cassava production as major plans in the agricultural transformation agenda. Therefore, to make this laudable initiative a reality, it is important that adequate attention is given to rice production and processing at all levels of government particularly in rice producing states like Ogun State. In order to transform the current trends in rice production and processing in Ogun State, it is pertinent that agricultural development agencies in the state need to work closely with the small-scale farmers in the field to understand the real situation of things and the challenges they face. This implies that, strategies on how to improve the working conditions of these farmers should be the central point in the government planning and implementation process.

In Ogun State, rice production and processing have not yet be fully mechanised and to be able to achieve this starting from land development the issue of government financial support plays a significant role. This also entails other financial and technical assistance from agricultural engineers, extension workers, researchers, non-governmental organisations (NGOs), and the

private investors. Given the natural endowments of Ogun state which includes favourable weather conditions, fertile land that supports rice production and its favourable ecological composition, the State has competitive advantage in large scale rice production coupled with great economies of scale. This will not only provide more employment opportunities in the state, but will further improve revenue generation in the State while at the same time enhancing the general living standard of the households that are connected to the rice value chain.

Sequel to the issues raised in the course of this study, the following recommendations are proffered:

- ✓ To enhance the production of rice, it is therefore germane that additional support for development of efficient rice seed varieties be advocated. It is also essential that the distribution of rice varieties that are resilient to climate changes be encouraged. The promotion of good agricultural practices that will help to compensate for the lapses rice production processes cannot be overemphasised in this regard.
- ✓ In terms of enhancing commercialization of rice production, modern means of rice production and processing that will enhance the quality and quantity of production should be adopted.
- ✓ In addressing the issues of poor content agro-chemicals, this study is of the opinion that adequate measure on the part of the government agencies such as: agricultural development programme (ADP) and Ministry of Agriculture charged with the responsibility of agricultural development to ensure proper supervision and inspection of the herbicides and other agro-chemical inputs before they sold to the farmers. These agricultural agencies could work in congruence with farmers association to procure these requisite agro-chemicals and supply to the different clusters of rice farmers within the State. This will help in reducing the incidences of adulterated agro-chemical inputs as well as the prices as it will become possible to deal directly with the producers of such agro-chemical inputs.
- ✓ It was noted in this study that the method of rice cultivation and harvesting mostly relied on labour intensive approach at the subsistence level in addition to low level of Agricultural extension agencies. An alternative, however, to encouraging farmers to increase their production base is through agricultural extension services. Therefore, for the rice farmers to operate at mechanised level of rice production government support is earnestly advocated for. For instance, information gathered from the interview conducted unveils that there is no machine for rice planting which results to drudgery in the planting process.
- ✓ To effectively control for bird's infestation, the farmers need to be financially buoyant in order to employ workers to assist them to do the job. Consequently, this would be incorporated into the production cost which will determine the final price of the processed rice at the point of sales and marketing, which makes the local rice variety uncompetitive compared to the imported varieties. Thus, developing a kind of mechanism that will be deployed to chase or scare away birds during the period when the grains are matured will be a welcome development in ameliorating this problem. Similarly, integrated pest management (IPM) can be developed and implemented for rice insects, which can be narrowed to a given locality as an effective control and management of pest and diseases that affect rice.
- ✓ In addressing the challenge of labour intensive harvesting and processing, the provision of modern threshing machine at the farmers' disposal will no doubt boost rice production and processing; reduce drudgery and time involved in the production process. This will further enhance the market potentials for the finished product. This is because evidences have shown

that modern threshing machines significantly reduce the tedious and time consuming nature of the traditional threshing method. The availability of modern processing machines will not only speed up rice production process but will further reduce the risk of exposure to weather due to moulding and shattering especially when the paddy rice is packed in the field to dry prior to the time of threshing. Mostly importantly, other losses arising from grain breakages could be controlled when the threshing duration is minimised. This consequently improves the quality and competitive nature of the rice in the international market.

- ✓ In the aspect of weak markets and linkages, it is important to have a market where the rice producers will be linked with their direct customers for supply. In this case, there will be regulatory authorities to regulate and standardise the price of processed rice according to their respective standard measurements which is to be determined by the agency in charge. However, the farmers interviewed explained that currently the demand for *Ofada* rice is higher than the supply. This could be explained by the reason that *Ofada* rice is like the plasmatic rice of India and contains more nutritional value compared to the polished imported rice.
- ✓ With possible multiplier effects for employment and input effects the implementation of the on-going Agricultural Transformation Agenda (ATA) can be re-strategized to reflect on how to improve the welfare of the small-scale farmers who are directly involved in the value chain. Government agricultural policies on rice production should focus more on means of replacing the traditional method of rice processing with modern equipment to enhance the productive capacity of this sub-sector. Provision of processing centres in selected LGAs; common pool of resources that the farmers can coordinate; electrification and provision of sound system to scare away birds especially when the paddy is matured will be right steps in right directions towards boosting rice production and thus, making it more affordable to majority of the citizens.

In conclusion, this study submits that the rice farmers alone cannot record a remarkable mass production because rice production and processing is capital intensive project which requires financial support from government, non-governmental organisation (NGOs), private investors interested in agriculture (*agri-preneurs*), among others. There is need for all stakeholders connected with agricultural productivity to work in synergy in cross fertilisation of ideas on the current challenges and prospects of agricultural production and modern food processing techniques that will enhance food security policy measures. Thus, this study calls on government, non-governmental organisations and private investors and stakeholders in the provision of financial assistance, agricultural grants, subsidy and accessible credit facilities in support of rice production and processing among the rice producing States in Nigeria especially in Ogun State.

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KEY TERMS AND DEFINITIONS

OSG –Ogun State Government- This describes a geopolitical location within the South West region of Nigeria which predominantly grows a special variety of paddy rice (OFADA rice) which trajectory of the specie origin traceable to the State

Formal Institutions – This refers to an officially recognised entity with properly documented ethics and established rules that guides and controls the activities of economic agents in the society.

Informal Institution- Connotes unofficial arrangement within the social which consists of societal generally accepted principles, moral values, ethics, norms and conduct that detects the way and manner group of individuals are controlled through the instrumentality of community leaders.

Respondents- Comprises of the stakeholder and principal personality with the necessary information required to in the process of executing the research.

OFADA Rice- A special breed of rice mostly produced locally within the South-West geopolitical region with high fibre and nutritional content compared to the imported polished rice.

Institutional Land Investment- This is mainly concerned with land investments such as farming that involves a group of people who are united by a common goal especially in the area of enlarging agricultural production and maximising profit from sales.

Large Scale Agricultural Land Investment- Deals with agricultural production in commercial quantities that could guarantee sustainability of the agricultural system and food security.

Rice Growers Association of Nigeria (RGAN) - Consists of group of persons that are bond by the common objective of ensuring sufficient rice production and marketing through the

formation of rice farmers clusters and through such arrangement facilitate the process of government intervention.

Key Informant Interview (KII)- This involves an interactive section with the key players in the rice production and processing particularly under the auspices of rice growers association of Nigeria, Ogun State Chapter.

APPENDIX

Figure A1: Traditional rice processing equipment for water supply during paddy rice soaking

Source: Fieldwork, 2016



Figure A2: Modern Rice Shelling Machine

Source: Fieldwork, 2016



Figure A3: Stone Removal Machine (*Destoner*)
Source: Fieldwork, 2016



ENDNOTES

ⁱThe KIIs conducted with officers of RGAN also confirmed this allusion with the additional information that there are no incentives to attract the youth into the agricultural sector.

ⁱⁱ The new government led by President Muhammadu Buhari, in 2016 Launched ‘The Green Alternative: Agriculture Promotion Policy (GAAPP), 2016-2020’. The GAAPP is said to build upon success of ATA as their goals are very similar with regards to making agriculture a profitable enterprise (Ministry of Budget and National Planning, 2017). This intervention is expected to encourage local production and value chain development with a view to reducing food import.

ⁱⁱⁱ The extent to which these programmes were achieved in the respective countries is outside the scope of this study.

^{iv} In some States, it is also known as Rice Farmers Association of Nigeria. However, this study sticks to the usage of RGAN for consistency.

^v It was learnt during KIIs that *Ofada* variety of rice was named after this *Ofada* village where it was first planted in Nigeria by a military officer who brought it during World War II. In addition, with the role RGAN, Federal University of Agriculture, Abeokuta (FUNAB) has assisted in breeding two varieties of *Ofada* rice.

^{vi} Figures A1 and A2 in the Appendix provide their pictures taken during the fieldwork.