FOOD SECURITY IN NIGERIA: A DEVELOPMENT FRAMEWORK FOR STRENGTHENING IGBEMO-EKITI AS A REGIONAL AGROPOLE

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ABSTRACT
Most governments in developing countries (DCs) now pay greater attention to food security, for self-reliance in certain staple food, particularly rice. This paper, therefore, considers the promotion of rice production in a growing town in Ekiti State, Nigeria. Two hundred and sixty four dwellers were randomly selected in the existing 21 residential quarters in the study area (Igbemo) and interviewed, out of which 170 were rice farmers. Data analysis was carried out using simple descriptive statistics such as frequency distribution and percentages, the Pearson Moment correlation test and the multiple linear regression models. Results show that most of the rice farmers (i) embrace local technology, (ii) operate on subsistence scale, (iii) realise low yield, (iv) earn low income and (v) lack institutional support to sustain production. Suggestions for policy measures were offered based on research findings.
Keywords: agropole, development, Ekiti State, food, food security, Igbemo, Nigeria, region, rice, strengthening.

1 INTRODUCTION
Food security has been a major concern of many developing countries (DCs), especially Nigeria [1]. It is easy to understand why food crisis has become a reality at the moment! The World Bank raised the alarm and now almost every government is sitting tight and warming up to the situation [2]. Already, in countries like Egypt, Haiti, Senegal and Zimbabwe, the emerging global food crisis has resulted in riots. Malawi, a densely populated country in Southern Africa, characterised by small landholdings per household, high reliance on rain-fed agriculture, low land productivity and low rural income, has begun to witness increased food and nutritional insecurity [3]. Food crisis has brought hunger to Nigeria as over 2.5 million of its population is threatened by food insecurity [4]. The greatest fear is that, the problem is spreading to Asian countries that account for the source of grain importation to the country.

Reduction in the number of people suffering from hunger to half by 2015 tops the list of the eight UN Millennium Development Goals (MDGs). This is because, the right to food is a universal right – rights that more than 854 million people worldwide do not have [5]. The DCs are worst hit by food insecurity due to their ever-increasing populations. Food insecurity in these nations is in terms of uncertainty, unsustainable production and inaccessibility to vital food resources to meet the daily food need of the population [6].

Nigeria, the most populous country in Africa, having over 140 million people, constitutes about a quarter of the continent's total population with agriculture as the largest sector of the economy, providing about two-thirds of the nation's work force [7]. Yet, consumers in the country spend a greater part of their income on food, while millions of people suffer from hunger and malnutrition due to poverty. On the eve of democracy in 1999, at least 87% of Nigerians' 120 million population lived in poverty [8]. This, without doubt, may have prompted the World Bank President, Mr. Robert Zoellick to lament that, the poor in many DCs now spend up to 75% of their income on food, a situation which puts them in precarious conditions [2].

Of all the food items, rice is the most widely consumed; indeed, 'the world's most important food product' [9]. Since the mid-1970s, rice consumption in Nigeria has risen tremendously (10.3% and

above per annum) as a result of accelerating population growth rate (2.8% per annum) and increasing per capita consumption (7.3% per annum) due to changing consumer preference [10]. Highlighting the comments of Osinami (Head of the Africa Centre in Nigeria) in 2006, Nigeria produces two million tonnes and consumes about five million tones annually, expending $800 million yearly on importing the deficit of about three million tonnes [11]. The Governor of Central Bank (Mr. Lamido Sanusi) at the Northern Nigeria Economic Summit organised by the Northern Political Summit Group (G20) declared that the country spent about $1 billion (₦155 billion) on the importation of rice in 2010 [12].

The momentous formulation of biofuel policies in the rich countries has also become another issue of concern. The Organization for Economic Cooperation and Development (OECD) now promotes the use of biofuel as the source of energy that reduces green house gas emissions and improves energy security by allowing less reliance on oil and gas from unreliable suppliers [13]. The implication of this is that the significant proportion of imported cereals, particularly rice, will be taken out of the food sector and be converted into fuel use with attendant high food prices. The food prices might become more volatile due to drought and the growing demand for biofuel as reported by FAO [14].

In Nigeria, the nominal price of a 50 kg-bag of rice (₦8,000 or $66.7 and above) has overshot the monthly national minimum wage of ₦7,500 ($62.5) as on December 2008. The situation remains the same until now (May 2011), it is an indication that majority of Nigerians might no longer afford to eat rice. The steady increase in overshot situation follows the stoppage of food (rice) exportation to Nigeria by countries like Thailand, Vietnam, India and Malaysia as a precautionary measure against the impending drought [2]. In a bid to ensure food security in 2008, the Federal government voted ₦80 billion ($0.66 billion) for importation of 800,000 metric tonnes of rice to relieve the rising food prices. Additional ₦10 billions (0.08 billion) was earmarked to boost rice production in 4 (Niger, Kano, Kebbi and Ebonyi states) of the 36 states of the country [15].

Ekiti State is one of the regions in the country where the rice production is assuming great importance among the majority of farmers [7]. Of all the major rice-producing towns (Igbemo, Ikole and Ijero) in the state, Igbemo has a national reputation for producing peculiarly tasty local rice. With an appropriate regional policy focused on strengthening this centre, there is an assurance of massive rice production to sustain government vision of food security in the country. The specific objectives of study are to: (i) identify the rice farmers' characteristics and the level of production, (ii) examine the existing Regional Development Policies and (iii) consider the possibility of exploiting the advantage of rice production in a new regional development framework to raise the level of food supply.

2 CONCEPTUAL FRAMEWORK FOR THE STUDY

The issue of food security is an evolving concept [16]. Highlighting a report by United Nations Research Institute for Social Development (UNRISD), the concept is a way of sustaining and assuring access by all social groups and individuals to food adequacy in quantity and quality to meet their nutritional needs [17]. Put succinctly, food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets the dietary needs and food preferences for an active and healthy life [18]. In DCs, millions of people suffer from hunger and malnutrition. At least 800 million people do not have access to sufficient food to ensure healthy productive lives, while about 170 million children suffer from malnutrition, serious enough to jeopardise their future physical and mental development [19]. Governments of these nations have evolved diverse strategies specifically in agriculture to deal with this vital issue.

The agricultural sector of the Nigerian economy contributes significantly to rural employment, food security and the provision of industrial raw materials, taking into consideration the modest

growth in the sector on account of favourable weather conditions [20]. A plethora of agricultural policies and programmes introduced in Nigeria, supported by the World Bank over the years have influenced food production significantly. For instance, the Special Rice and National Fadama Development Projects exist due to the huge injection of funds from the World Bank [21].

Nigeria has one of the fastest rates of urbanisation in the world – approximately 5.3% per year [22]. The increasing emphasis on agricultural growth and development amidst a rapidly growing population in part, reflects the concern with which policy makers have viewed the rising demand for food [7]. However, only regionally coordinated agricultural and food security policies can offer good approaches for sustainable development, as considerable additional public and private investments would be necessary to accelerate the pace of agricultural growth [23].

Many countries introduce regional policies to meet certain regional needs. Improving the efficiency of a notable industry, raising the level of gross regional product per head of total population, improving the distribution of regional income are typical regional policy directions for meeting identified needs [24]. Throughout the period of 1945–1980 for instance, planning policy at the regional level in Great Britain was targeted at the less prosperous regions of the North Scotland and Wales for the creation of factory jobs, unlike the more prosperous regions of the South and Midlands which were already commercial centres and seats of expanding service industries [24]. Korean government targeted its cities for anti-poverty programmes in the 1980s, because from the 1960s, the growth of urban population in the region was accompanied by high levels of concentration of urban dwellers in a few large cities [25].

In 1983, the District Focus for Rural Development (DFRD) was initiated in Kenya, targeting the rural districts for allocation of resources to enhance utilisation of local resources, thereby increasing employment opportunities [26]. Botswana government, as in Kenya, Tanzania and Indonesia, adopted some form of regional development planning which corresponds with the complex character of rural development [27]. State and Local Government creation, River Basin Development Authority (RBDA), Niger Delta Development Plans, Agricultural Development Projects (ADPs) among others are visible regional planning approaches in Nigeria aimed at satisfying socio-economic needs of people in different geographical areas. Evidence from the literature review above reveals that most regions cannot develop naturally without planning interventions. The intervention is usually directed at changing the spatial distribution of physical infrastructure, population and economic activities [28]. As observed, 'the growing failure of some areas is usually on account of the unfulfillment of the expectations of those who live in them and those who have to depend on them for service' [29].

This study has adopted the agropole concept as a prop. The concept was developed to provide deductive explanation for the importance of a centre (town) in a region. It is predicated on the ideals of economic welfare of a region subject to a dominant agricultural activity. It is derived from the concept of 'growthpole' which implies a centre with some indicators of growth [30]; a geographic agglomeration of activities [31], and indeed, the centre of an activity whose output influences the performance of many other activities in a particular economy [32]. The objective function that is maximised in the definition is the economic attribute a particular centre possesses, that reflects some features of central place in a growth-inducing geographical context. Regional agropole in this study, therefore, emphasises a major centre that produces an agricultural product with some spread effects on the whole regional economy.

One major factor creating structural differentiation of a centre and its periphery is the existence of a propulsive industry [33]. This industry is characterised by three important features: (i) high interaction with other firms, (ii) a high degree of dominance and (iii) a relatively great size [34]. Industries that possess these three attributes are normally characterised by output data higher than the average, and through their high growth rates affect other industries and the entire output of the economy [35].

The regional agropole (Igbemo) in this study produces higher tonnage of rice (3.7 tonnes per hectare annually) which overshoots the '1.5 tonnes per hectare average yield in the entire state' [7]. It is a centre of attraction to most Ekiti State indigenes that trade on rice, where massive processing activities promote rice marketing state-wide.

The average of 10 acres (4 hectares) of land used for rice cultivation annually in Igbemo is regarded as peasant as it falls below a standard of 5 hectares expected [36]. Strengthening this centre, therefore, implies restructuring the existing regional development framework to impact Igbemo as an agropole, thereby eliminating the chronic features of peasant farming, undercapitalisation in relation to potentials for development, food diversification with telling effect on food security [23].

3 MATERIALS AND METHODS

3.1 Research design

The study was designed to combine primary survey-based data of rice farmers from the administrative wards in Igbemo with secondary information extracted from records with the State Independent National Electoral Commission (INEC), the Ekiti State Agricultural Development Project (ESADP) and the Benin-Owena River Basin Development Authority (BORBDA). The research instrument used was a well-structured questionnaire which was designed to investigate 35 and 20 variables on rice farming and agricultural institutions (ESADP and BORBDA), respectively in the state. The variables were structured in question form and responses were sought in pre-coded alternatives given. The stability and consistency of the instrument used were tested using the 'split-half' method. The questionnaire was divided into two parts based on odd-numbered and even-numbered questions and administered separately to a sample of respondents at the same time and scored accordingly. The two sets of scores gave a high correlation coefficient, indicating high reliability of instrument. Five fifth-year Urban and Regional Planning students of the Federal University of Technology, Akure who acted in the capacity of research assistants and had earlier been tutored by the authors, administered the questionnaire through face-to-face contact with the respondents (rice farmers) in the evening for two weeks in August 2008. They were instructed to read and interpret the questions in Yoruba (the local language in Ekiti State) in cases where the respondents could not speak English. The simple random sampling technique was adopted and data collected were subjected to analysis at three levels. The first was univariate analysis which described the attribute and behaviour of each variable, the second was bivariate analysis which described the relationship between pairs of variables. Specifically, the Pearson Product Moment Correlation Co-efficient (R) test was used because of the interval nature of data. The third was the multivariate analysis involving multiple linear regression models to determine the resource use efficiency of rice farmers in the area.

3.2 Research locale

The research was carried out in Igbemo-Ekiti, a Yoruba speaking town in the South-western part of Nigeria. It locates between longitude 5°23' and 5°24' East of the Greenwich Meridian and Latitude 7°41' and 7°42' North of the equator. It lies within an upland zone; rising over 250 metres above sea level. Politically, it situates within Irepodun-Ifelodun Local Government Area (LGA) and Ekiti Central Senatorial District of Ekiti State. There are 11 major settlements in the LGA. By the estimates of the Department of Population Activities, Cabinet and Special Service, Ekiti State Governor's office, Ado-Ekiti in 2005, Igbemo ranks third with a population of 23,024 after Igede (35,996) and Iyin (37,931) out of total population figure of 161,286 for the entire LGA.

3.3 Database description

In this study, two types of interview were conducted with individuals in Igbemo-Ekiti and officials of BORBDA and ESADP charged with agricultural development in the state. The sample size for the study was determined taking into consideration: (1) the level of confidence desired in estimating the sample size Z = 1.96 at significant level of 0.05; (2) the sampling error that could be permitted $e = 0.06$; (3) the estimated true proportion of success $p = (0.5)$ [37, 38]. Thus, sample size (**n**) was calculated as;

$$\mathbf{n} = \frac{\mathbf{z}^2 \mathbf{p}(1-\mathbf{p})}{\mathbf{e}^2} \qquad (1)$$

Since sampling in the exercise was done without replacement from the population, the finite population correction factor was applied, thus;

$$\mathbf{n} = \frac{\mathbf{nN}}{\mathbf{n} + (\mathbf{N} - 1)} \qquad (2)$$

Where $\mathbf{n}_1$ = sample size with correction factor, **n** = sample size without correction factor and N = population size.

A total sample size of 264 was derived for the town. This was disaggregated proportionately into the 21 residential quarters, coterminous with the Independent National Electoral Commission (INEC) political or administrative wards in this area. In the absence of the rice farmers' register and distribution of the town population to the different wards, the numbers of households in the residential buildings constituted the research population in each ward. Thereafter, samples were randomly chosen using the table of random number generator from the wards which represent well-defined data delineation areas (DDAs). In a selected house, one household head aged 18 and above was interviewed. This approach was adopted because it is not likely to affect the findings of this research adversely due to the uniform characteristics of the buildings and human population in the DDAs [39, 40].

At Igbemo-Ekiti 87.0% are farmers, of which 74.0% specialise on rice production. Subsequent analysis focused on this group (rice farmers) as the targeted population. The variables that were employed in the analysis are: sex of the farmers, hometown and years of engagement in rice farming, motivating factor into rice farming, annual income of rice farmers, land area cultivated annually and rate of labour engagement. Others include category of materials or tools and agrochemicals used in farming, annual expenditure on farming in relation to harvest, problem encountered in farming and assistance by institutions. Directors of the institutions were targeted for questions on programs for rice production, rice experimentation project carried out in Igbemo and the success recorded. Assistance given to individual rice producer, the level of patronage and their operational problems were also investigated to ascertain possible impact of the institutions on the town.

3.4 The existing regional development policies

The visible regional administrative structures in the study area are the Federal Agencies, Ekiti State and LGAs. As explicitly expressed in the 1975 Nigerian Regional Development Policy, the three tiers of government (Federal, State and Local) are meant to demarcate the economic regions as focus of attention in the formulation and implementation of Regional Development Policies [41]. Among the 36 states in Nigeria is Ekiti, with 16 LGAs. The LGAs are organised political units through which the Government carries out equitable distribution of resources, investment decisions and development of projects to achieve a balanced growth amongst the geopolitical zones.

The state falls under the BORBDA is a federal institution that is primarily concerned with agriculture and water supply, rural development and flood and erosion control [28]. Ekiti State falls within the catchments of this agency. As a way to integrate rural areas in regional development for the purpose of creating and increasing food production in the sub-regions, the establishment of ADP in each state emerged. As a regional Agricultural Development Policy, it is supported by the World Bank for grass-root development especially in rural areas with targets on farmers. The ESADP operates under the State Ministry of Agriculture where it is to promote farm extension services and facilitate improvements in the species and management of arable crops and livestock. The International Institute for Tropical Agriculture (IITA) and the Institute of Agricultural Research and Training (IART) have been collaborating with ESADP to realise tangible results.

No doubt, the state's ADP offers numerous services to the farmers. It assists in land clearing by releasing machineries on rentage, provides fertilisers, seeds and professionals who offer expert advice to the farmers on the use of machines and chemicals. Information gathered from the Director, Seed Processing Unit of the institution reveals that, most farm inputs (seeds, herbicides, fertiliser, insecticides and machines) are supplied free-of-charge during planting, followed by the deduction of cost when farmers bring the seeds to ADP after harvest. In his words, insincerity of farmers has scuttled the arrangements as they often report poor harvest and sell to outsiders. This practice, coupled with poor funding by government has militated against effective operations of the institution in the state.

4 EMPIRICAL FINDINGS AND DISCUSSION

4.1 The farmers' profile

This section describes in simple terms, the operational characteristics of the farmers in the town's economic activities. These findings are necessary because, they create an appreciation of the framework under which the farmers operate; and reveal the requirements and other key development factors which have affected the industry and have direct relevance to strengthening the town for efficient regional impact.

4.1.1 Sex

Studies on farm efficiency are fraught with conceptual and methodological problems. These include the difficulty of defining appropriate measures of productivity in different farming systems, omission of individual characteristics and lack of clarity regarding the measurement of gender differences as well as lack of gender disaggregated data [42]. In the study area, 69.4% of the farmers are males – a direct contradiction to the common view that rice is a woman's crop, particularly in West Africa [43]. Considering the technical innovations and labour demands of rice farming tasks (bush-clearing, application of chemicals, pest control, etc.), the involvement of more male is envisaged. Women have so many household responsibilities (cooking, washing, child care, etc.) which compete with farming activities. In most cases, farms owned by women are often managed by helpers, usually their children and hired labour [7].

4.1.2 Hometown and age

About 11.1% of the farmers are immigrants who have left their different home communities to join the indigenes in cultivating rice. It is revealed that 88.9% of the rice growers in Igbemo are natives of the town. The perception at this point is that, these migrants, though meagre, are likely to contribute further to the stability of the work force and maintain contacts within the rice production system.

Majority (52.8%) of the farmers are in the age-bracket 46–59 years followed by age 31–45 years (34.3%). Coincidentally, many of them (72.2%) claimed to have remained on the job for more than 10 years. This breakdown shows that the aged farmers are more engaged in rice cultivation in the town. The relatively old age of rice-producing population has implication for productivity and policy implication.

4.1.3 Motivation

The study reveals that 76.9% of the farmers are prompted to plant rice because it is lucrative. Actually, the Ekitis, a major ethnic group in the Yoruba race, have unique dietary characteristics and preference for specific food items like: yam, gari (cassava flour) and rice. The first two are grown by virtually all households in the region and have close substitutes such as cocoyam and 'lafun' or 'fufu' (cassava products), respectively. During the field survey in 2008, 1 kg tuber of yam was sold for between ₦80 and ₦100 ($0.67 and $0.83) while the price of 'gari' ranged from ₦60 to ₦70 ($0.50–0.58) per 'congo' (the common unit of measurement of 1.2 kg). The same quantity of rice (1.2 kg) was selling for between ₦180 and ₦200 ($1.50 and $1.67). The high rate of demand for rice is often accompanied by an increased price. Only 19.4% inherited the job from their parents, 1.9% believed it as an opportunity since they could not afford to go to school, while the same proportion (1.9%) attributed their involvement to environmental factors (soil and climate) which, indeed, support the growth of rice.

4.1.4 Annual income

The managerial capabilities of the farmer, the capacity to procure essential inputs and embark on extensive farming, depend on income. Unfortunately, the largest proportion of the farmers (38.9%) disclosed annual earnings below ₦50,000 ($416.67), followed by those (34.3%) whose income range fall within ₦60,001–70,000 ($500.00–583.33) and ₦50,001–60,001 or $416.67–500.00 (19.5%). The remaining 7.3% earned above ₦70,000 ($583.33). Generally, these farmers are low income earners; small holders who depend only on their meagre earnings and savings as sources for their financial needs. The reasons for this are obvious. Indeed, poverty index is higher in Ekiti State than national average [7]. Igbemo is purely an agrarian community where rice farming as a major occupation of the population has not grown fast enough to generate high income. This is evident in the correlation test which indicates strong relationship between the farmers, annual income and harvest as determined by the farm land (size), inputs and expenditure (Table 1).

4.1.5 Land and labour applications

Approximately, 93.5% of the farmers cultivate less than 10 acres annually, 5.6% cultivate 11–20 acres, while the remaining 0.9% cultivate between 51 and 60 acres. As expected, the poor financial positions have not allowed them to embark on mechanised tillage (i.e. using complex or sophisticated machines to prepare land for farming). However, the average of about 4 hectares is the approximate per capita area of land used for rice cultivation annually in this area. This is peasant because it falls below the recommended 5 hectares [35]. In the past, rice farming was a family business. Now, more people have their own separate farms, hence, family members are not enough to meet the labour needs [7]. Virtually all the farmers (98.1%) engage the services of labourers. In most cases (53.7%), five to six labourers are engaged, usually once or twice during a particular farm season. A labourer charges ₦600–800 ($5.00–6.67) for bush clearing or weeding of rice farm on daily basis. For planting, harvesting and bird scaring, the average cost is ₦500 ($4.17). This labour cost component seems to account for the highest share of the production cost.

Table 1: Correlation coefficient matrix of rice farmers' variables in Igbemo-Ekiti.

Variable code	HARVEST	LABOUR	AREA	INPUT	EXPDT
HARVEST	1.000	0.276	0.221	0.582	0.274
p-Value		0.000	0.000	0.000	0.000
LABOUR		1.000	0.039	0.120	0.070
p-Value			0.323	0.750	0.204
AREA			1.000	0.108	0.421
p-Value				0.001	0.000
INPUT				1.000	0.464
p-Value					0.000
EXPDT					1.000
p-Value					

Source: Authors' fieldwork, 2008.

Table 2: Stepwise variable selection for rice farmers' harvest in Igbemo-Ekiti.

Model	Unstandardised coefficients		Standardised coefficient	t	Sig
	B	Std. error	Beta		
1. (constant)	0.185	0.132	0.800	1.405	.162
EXPDT	1.028	0.065		15.891	.000
2. (constant)	−0.157	0.127	0.470	−.240	.217
EXPDT	0.604	0.086	0.441	7.050	.000
INPUT	9.514E-02	0.014		6.625	.000
3. (constant)	−2.161	0.369	0.277	−5.850	.000
EXPDT	0.356	0.089	0.627	4.013	.000
INPUT	0.135	0.015	0.264	9.161	.000
AREA	1.946	0.341		5.706	.001
R	0.896				
R^2	0.804				
Adjusted R	0.789				
N	170				

Dependent variable – HARVEST.
Source: Authors' fieldwork, 2008.

4.1.6 Farm inputs and expenditure

Igbemo farmers practice upland rice farming, where all farm operations are done manually with local tools (100%), mainly, cutlass and hoes. For instance, clearing and planting are done with cutlass. Because of the close planting distance or interval, weeding and dibbling are done

with the use of a hoe. About 85.2% of the farmers use agrochemicals, out of which 88.0%, 8.7% and 3.3% apply fertilisers, herbicides and fungicides, respectively. Further analysis indicates that while 96.7% use both fertiliser and herbicide, 91.3% depend only on fertiliser and fungicide. A few (12.0%) use only herbicides and fungicides without fertiliser. Generally, most Nigerian rice growers use little improved varieties for which demand for fertilisers and other agrochemicals are high [44]. However, the use of fertiliser is dominant because rice is a fast soil depleting crop.

It is apparent that these farmers expend a considerable amount on rice farming. The farming expenditure covers cost of labour, transportation and farm inputs such as working tools and chemicals. These were examined in the four years preceding this study (2004, 2005, 2006 and 2007) in relation to harvest for comparison. In 2004, largest segment of the respondents (39.8%) spent between ₦5,000 and 10,000 ($41.67–83.33) per hectare of farm land with the highest yield between 1001 and 1200 kg. This is equivalent of ₦125,125 and 150,000 ($1042.71 and $1250.00). In 2005, the same range of amount (₦5,000–10,000) was expended by most of the farmers (44.4%) only to realise relatively lower highest yield of between 801 and 1000 kg (28.7%) on account of high drought. Translated, 801 and 1000 kg amount to ₦100,125 and 125,000 ($834.36 and $1041.67). In 2006, the highest yield was between 801 and 1000 kg (26.9%) with the same expenditure profile. In 2007, the highest yield rose to between 1201 and 1400 kg (₦150,125–175,000, i.e. $1251.04–1458.33) due to the threat of banning importation. With the minimum expenditure of ₦5,000 ($41.67) in the four years under review and minimum annual earnings of ₦120,000 ($1000.00), ₦95,000 ($791.67), ₦95,000 ($791.67) and ₦145,000 ($1208.33) for 2004, 2005, 2006 and 2007, respectively, the average minimum profit margin, therefore, stands at ₦113,750 ($947.92). This exceeds the N80,000 ($666.67) which majority of the farmers (97.2%) claimed as annual income. It is, therefore, easy to conclude that the farmers have difficulty in estimating income because of dismal book keeping.

4.1.7 Farming problems

Looking at their operational patterns, the farmers face a multitude of problems, The major one is lack of fund or access to credit facilities (89.8%) as a result of poverty. Others, though minor, include difficulty in securing labour (2.8%), land (1.9%), poor weather condition (1.4%), lack of access to farm materials (0.9%), pest and bird control (2.8%). Bird and pest control are serious problems [35], but the farmers in Igbemo have developed traditional means of coping by tapping the farm with cassette tape, erecting human statutes (effigy) in strategic locations within the farm, use of scaffolds (Fig. 1) and a host of others.

Prominent among the problems are the seasonality of production and lack of institutional assistance (93.5% of the farmers). Ekiti region enjoys tropical climate with two distinct seasons: rainy season (April–October) and the dry season (November–March). Usually, the rains last seven months, covering the periods of rice production activities. The milled rice is in circulation from August (after harvest) till January when the farmers (99.1%) who rely on self-harvest start to make reserves for New Year planting. This implies that the consumers witness long period (about six months) of scarcity every year. Obviously, none of the two government institutions (BORBDA and ESADP) charged with agricultural development has been able to influence the rice farming system in Igbemo for perennial production. Lack of fund has limited the extension of their services to this area. Banks cannot grant loans because most farmers lack collaterals that could make them credit worthy. It is noted that, part, if not all, of the reasons that the rural development projects meet with failure is due to lack of appropriate institutions for development [45].

Figure 1: A typical scaffold used in scaring birds in a rice field in Igbemo. The structure is usually built on stilt and suspended to about 2.4 metres above ground level. It creates a platform where the rice farmer oversees his farm. There the farmer sits with a catapult (slingshot) which is used to scare the birds as they arrive in their thousands. This operation requires much effort and timing otherwise, the farmer may lose the whole rice field to birds. However, it is a partially effective method. *Source*: Authors' fieldwork, 2008.

4.2 Regression estimates

The basic assumption in this study is that the quantity of rice harvested (HARVEST) in Igbemo will be determined by the land area cultivated (AREA) by the farmer, labour engagement (LABOUR), tools and agro-chemicals used in the farm (INPUT) and the expenditure on farming (EXPDT). The processing of data was carried out using Version 10 of the Statistical Packages for the Social Sciences (SPSS). Before the regression analysis, all the variables were correlated to ascertain the co-linear relationships between them so as to eliminate proxy variables. From the regression results, only three of the variables (EXPDT, INPUT and AREA) significantly affected the annual harvest of rice in Igbemo. These variables were introduced stepwise into the model to obtain the best regression equation. The equation of best regression applying the least square algorithm was:

$$Y = -2.161 + 0.356 \text{ EXPDT} + 0.135 \text{ INPUT} + 1.946 \text{ AREA}$$

The variable EXPDT has 0.277 as the absolute value of beta coefficient, indicating that rice HARVEST will increase by 27.7% if the current EXPDT of farmers increases by 100%. As expected, harvest yield depends on the farmers' ability to employ many labourers and manage the complex web of obligations in rice farming. Increase in expenditure, no doubt, will result in improved productivity leading to increase in harvest [20].

Application of INPUT impacts significantly with HARVEST as rice farming output increases by 62.7% while efforts are made to double agricultural input. This is predictable because, the agro-chemicals used by the farmers are mainly fertilisers [46] and fungicides, while the use of hoes and cutlasses on farmlands is common.

There is strong indication that HARVEST will increase by 26.4% with 100% increase in the land area (AREA) put under rice cultivation. Shifting cultivation using local tools prevails in many of the farms. Traditionally, manual slash and burn is the main method of cultivation in Nigeria which limits the size of farms [21]. The rice farmers' desire for changes that will profoundly affect production can only be expected from advanced technology of mechanisation in farming capable of increasing annual harvest.

4.3 Assessment of impacts of the regional development policies

Field observations show that BORBDA and ESADP have no significant programme for Igbemo. The inability to operate with sufficient capital is a major hindrance to rice productivity in Igbemo. None of the farmers in the town enjoyed mechanisation aid – a situation that makes it difficult to realise extensive cultivation. Resources such as rivers, favourable climate, labour and land abound in Igbemo and environs which the institutions have failed to harness to enhance rice production. Currently, BORBDA focuses attention on canalisation of flood water in the cities which is a misplaced priority. Apparently, the farmers lack modern technologies and farm extension services training as well as seed management information by the ESADP for effective operations. The ESADP seems more interested in demonstration farms for maize and occasionally rice, at designated centres without serious impacts on the farmers' ability to follow the model farms. These institutions lack records of levels of rice production in Igbemo. Essentially, they are inactive because, the State government is yet to demarcate agriculturally progressive districts for projects and supports with special funds to complement the Federal government food security policy.

5 POLICY ISSUES AND CONCLUSION

This study has looked into food security in Nigeria focusing on Igbemo as a regional agropole. It sourced data among 170 rice farmers in the town and the two government institutions relevant to agricultural development. It has also adopted a random sampling technique to select the farmers for investigation. Data analysis shows that:

  i. Rice farming is common among men in the town,
 ii. Majority of the farmers are indigenes with long years of rice farming experience,
iii. Profitability of rice production motivates many into farming as expected,
 iv. The hiring of labour in rice farming is usually sourced outside the nuclear family,
  v. Traditionally, the farmers depend on the use of local tools and agrochemicals,
 vi. The farmers cultivate below 10 acres of land per average farmer,
vii. Annual income of majority of the farmers is relatively low at ₦80,000 ($666.7) or below,
viii. Average annual harvest of 3.7 tonnes/hectare is still at subsistence level, because it is less than 5 tonnes/hectare,
 ix. Other problems of production in the town include: low funding, seasonality of production and lack of institutional assistance especially finance.

Rice, as a major crop produced in this area, makes Igbemo a definite agropole requiring special regional planning policies through restructuring strategy (RS) of Federal and Ekiti State government agencies. By this, the planning and management of District-specific projects will be under a proposed Regional Development Commission (RDC) – an autonomous government economic parastatal for staff mobilisation, motivation and goal achievement in food security (Fig. 2). In the absence of an effective institutional arrangement to propel modern agricultural practices in rice farming, food security in Nigeria will be a mirage. Igbemo needs such an interaction as a regional agropole.

This framework proposes a joint effort by the Federal and Ekiti State governments. As experienced in Senegal, 'satisfactory development of rice in the country remains elusive because, the development of key production factors like harvest yields, water consumption and the expansion of irrigated areas lagged far behind the country's potentials' [9]. It is anticipated that BORBDA (federal agency), therefore, will help to canalise the existing rivers in the district such as: river Ogbese, Oniyan, Akomolasan, Efo, Odoba and Akomowani into rice farms to aid irrigated rice system.
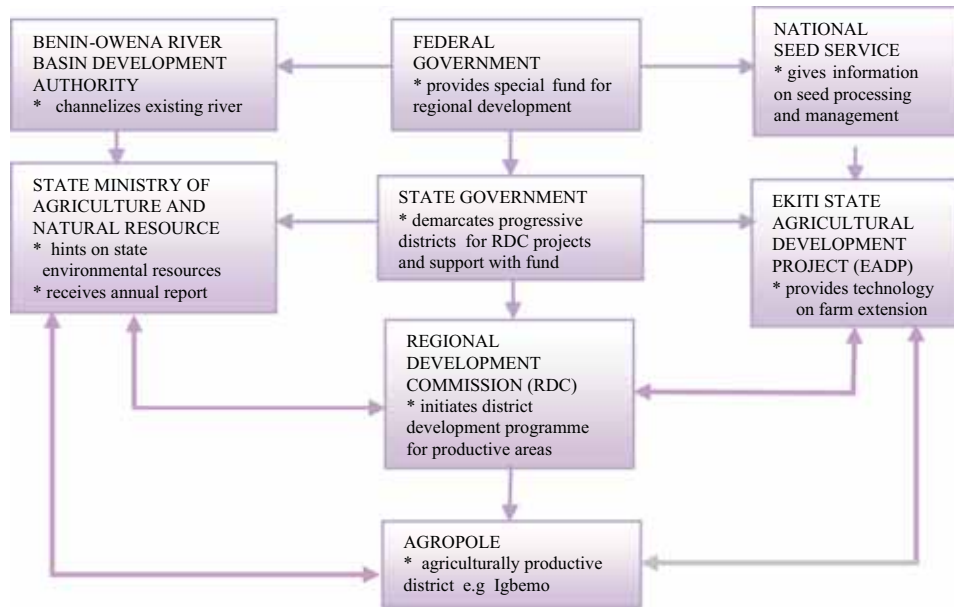
Figure 2: A suggested regional development framework for Igbemo among other agropoles.

The National Seed Service (also federal agency) will provide information on seed processing and management to the RDC through the ESADP.

A distinct pattern of sex-based division of labour is evident in rice farming in this area. To encourage full participation of women, the RDC should concentrate on human resource mobilisation (HRM) free of gender bias for attraction of labour. The agricultural extension workers who introduce new techniques and inputs to farmers under the RDC should avoid the usual focus on men as primary producers neglecting women – another vibrant resource in rice production.

At the regional level, the State government will demarcate the geographical limits of the agropole for RDC projects and support with fund to complement the Federal government special fund for food security. The ESADP will encourage farm mechanisation (utilisation of modern farm implements for ploughing, puddling, planting, weeding and harvesting) at subsidised cost to improve rice production technology, thereby reducing labour engagement while extending farm lands for high productivity. In this connection, the State Ministry of Agriculture and Natural Resources will hint the RDC regularly on the state of environmental resources at the agropole such as land, water, minerals, climate, etc. for introduction of farm development programmes.

A huge potential exists for Igbemo rice if it can be further processed to other vital food items (rice flour, cake, noodles, wine, etc.) to facilitate more transaction and increase demand within and outside the region. Just as the case of Ofada rice in Ogun State, the RDC can also collaborate with the Department for International Development (DFID), UK and notable marketing companies that can package the rice products in sachets and boxes with uniqueness of aromatic flavour for exportation. The thrusts of this value enhancement strategy (VES) are capacity building of Rice Farmers' and Processors' Association, as well as formation of Igbemo rice network (IRN), which is expected to facilitate and coordinate further development of the rice value chain.

On funding, the RDC through the State government can collaborate with development partners (international, governmental and non-governmental organisations) and coordinate development

funds effectively. Traditionally, only self-financing option is apparent in the farming enterprises. At this point, organisation of Cooperative Societies (CSs) is advocated to allow easy access to loans in micro-finance banks, to restructure the farmers' enterprises financing. The RDC can also partner with the organised groups and co-invest on projects of interest since Igbemo possesses potentials for profitable investments.

When the RDC agricultural projects become operational in Igbemo, the profitability of the rice product will, no doubt, spur rice farmers to expand land area. Expansive rice production activities with intensive use of agrochemicals will also result in deforestation, soil degradation processes such as loss of top soil, leaching, acidification, etc. with serious input on biological diversity. These environmental impacts call for serious ameliorative measures by the RDC through constant environmental impact assessment (EIA) of the rice production activities to determine their possible impacts on the people. This will make Igbemo environment friendly, greatly modified to reduce the environmental and social costs of achieving sustainable food security in the region and the country.

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