



CONSTRAINTS TO EFFECTIVE RICE FARM MECHANIZATION IN AGRICULTURAL BUSINESS IN ENUGU STATE, NIGERIA.

NNADOZIE, A.K.O^{*1} OYEDIRAN, A.G² NJOUKU LA³ NOMEH A.O⁴

^{*1}Marketing Department Federal College of Agriculture, Ishiagu, Ebonyi State, Nigeria.

²Fisheries Technology Department Federal College of Agriculture, Ishiagu, Ebonyi State, Nigeria.

³Marketing Department Federal College of Agriculture, Ishiagu, Ebonyi State, Nigeria.

⁴Marketing Department Federal College of Agriculture, Ishiagu, Ebonyi State, Nigeria.

KEYWORDS: Rice export, farm mechanization, entrepreneurship, job and wealth creation.

ABSTRACT

A descriptive survey research on constraints to effective rice farm mechanization in agribusiness in Enugu state, Nigeria between April and November, 2015. The researchers employed purposive sampling approach to select rice producing council areas in the state. Thus, Aninri, Ezeagu, Nkanu east, Isi-uzo, Oji-river and Uzo-uwani were selected. Thereafter, a simple random sampling was adopted to select 133 rice farmers in each of the selected LGAs which gave a sample size of 798 out of target rice farmers' population of 6,000; while the representatives of the permanent secretary and director in ministry of agriculture were selected to respond to the instrument of data collection. This gave a grand total of 800 respondents used for the study. The researchers used an open ended questionnaire which was validated by an expert in education measurement and evaluation in Enugu State University of Science and Technology before its use. The reliability of the data instrument was 0.82 or 82 % which confirmed its ability to measure consistently what it ought to measure. Data analysis was achieved by use of chi-square(x) and decision rule was Accept chi –square if calculated/observed value is greater than the tabulated value. Data results implicated the following findings: there is little rice farm mechanization in Enugu State, effective rice farm mechanization in Enugu State will encourage youths, use of modern farm implements in massive food production and use of waste lands in fish culture. The study also indicated that earlier state and federal government's rice farm mechanization were inadequate. It was also found out that there exist many constraints to effective rice farm mechanization in the study area. Based on the results, the researchers concluded that there are several constraints to rice farm mechanization in Enugu state, Nigeria. These include; use of manual threshers, labour, old mill engines, knapsack sprayers and other crude farm implements. Others are lack of improved extension services, irrigation facilities, farm credits, de-stoners / stitching devices, rice planters, combine harvesters, integrated processors boom sprayers, motorized fertilizer applicators.. The researchers recommended the following:

There is an urgent need to infuse modern farm mechanization into our farming culture and fabrics. The solutions among others is that agriculture modernization is the corner stone of rural and urban development through job and wealth creation, and higher return on investment (ROI) in agriculture among others.

INTRODUCTION

In rural areas where commerce and industry are not well developed with low industrial clusters, and their population growth rate is high while their per capita income is low and more than 75% of them are engaged in farming, agricultural modernization may be seen as the corner stone or pillar for both rural and urban development via job and wealth creation especially in the era of youth unemployment as in Nigeria (Amorn, 1989; Nnadozie and Uzoigwe ,2002;Nnadozie and Ugwu, 2008) . Wasteful over consumption by some in the developed countries and the continuing, in most cases worsening, hunger of millions in the third world is dramatic indication that food problems are really urgent(Henry, Ben and Maureen, 1990).

Chukwuemeka(1998),Armon (1989), Friday & Eddy(2013); agreed that for rice farm mechanization to be efficacious , it should be preceded by change in farm operations and rethink in attitudes. Such changes according to Emedome (1990), would lend to increment in farmers' productivity, thus, food production and higher farm earning with high return on investment (ROI) by effective use of modern implements and waste lands for fisheries while the stress of manual and tedious labour will become lesser. This will in turn create more avenues for emergence of workforce in other sectors of the economy through multiplier effects which will engender socio – economic cum industrial development by higher food security and adequate supply of fish protein characteristics of the Asian tigers' emancipation from third world economy to developed economy.

According to Ugwu, Nzeh and Amakom (2013), the Nigerian Economic Summit Group (NESG,2011) asserts that agriculture would remain one of the key routes to Nigeria's prosperity in this new millennium if and only if all



stakeholders give the sector the required attention it deserves. Ugwu *et al* (2013) further reiterated that apart from contributing the largest share to GDP, it is the largest non-oil export earner, the largest employer of labour and a key contributor to wealth creation and poverty alleviation, as a large percentage of the population derives income from agriculture and related activities or agricultural businesses. Nwobiala and Nnadozie (2014) quoting Doss (2003) stated that adoption of improved technologies will not improve food security and reduce poverty if barriers to their continued use are not overcome. These may include size of farm holding, farm finance, education level, family size, farm experience, membership of farm groups/associations, culture among many others.

Nwobiala and Nnadozie (2014) reported on profitability analysis of okra farming in Awgu LGA, Enugu state Nigeria, a gross margin profit of N28.886/ha and Benefit Cost Ratio (BCR) of N1.76 which implies that for every N1.00 spent, an okra farmer gets N1.76. This is 76 % ROI. However, the authors argued that when a technology is introduced in a given area, the choices available to rural farmers are not just adoption or rejection as many researchers think, but farmers' choice if to adopt an entire package of recommended techniques which is influenced by many variables of production factors.

There is therefore, need for a well thought out strategic plans to imbue rural farmers with opportunities for use of modern and scientific farm mechanization techniques and skills that would woo and lure youths to farming, thus boosting agricultural productivity in Enugu state in particular and Nigeria in general. Obi (1998); Umezue (1989); Nnadozie and Onwubuya (2003) asserted that the best way to approach this transformation is by the establishment of small and medium scale mechanized intensive agricultural enterprises, under the auspices of modern strategic farming methods with improved input supply and marketing value chains. This approach in the opinions of Umezue (1989), Oruka (1980), Nnadozie and Ugwu (2008) requires that wage labour are hired to operate at optimum under the supervision and tutelage of managerial elites and experienced experts in agricultural enterprises management where able retirees serve as contact farmers replica of the farmers' field school model (FAO, 2008).

The ideal axiom as reported by Nweke (1990) is that agriculture permeates the fabrics of other Nigerian economic sectors, hence must never be disregarded in the scheme of things if we must really achieve self reliance and sustainable food security with job creation and poverty reduction. Corroborating the above views of Nweke (1990), Ezeali (1990) agreed that we must make concerted and frank efforts to engender steady growth in agricultural production. There must be a rethink on youths' apathy towards agriculture (Nnadozie, 2002; Nweke, 1998; Obi, 1990; Achebe, 1985).

These assertions points to the fact that we are presently not on the right path to posterity through agriculture in the committee of nations (Obasanjo, 1987). Our current attitude towards agriculture is disenchanting and disgraceful (Nnadozie, 2002). Based on available empirical evidence, the authors by implication inferred that the nation may not so soon be in the right direction with the needed momentum really required for aggressive and massive agricultural sector development that will engineer higher Gross Domestic Product (GDP) percentage that will evolve higher per capita income, higher literacy level, low child mortality rate, reduced incidence of debilitating HIV/AIDS, higher longevity ratio of the elderly and vulnerable groups which formed the thematic objectives of the (MDG) millennium development goals of the United Nations which Nigeria is a signatory.

This study is an attempt to unveil the obstacles behind several failures in the bid to improve the mechanisms to mechanize all the machineries in modernizing farming, ditto rice farming and change our mind sets with greater youths empowerments in the nation's dire need to increase her foreign exchange earning capacity from non-oil sector (Nnadozie, Ume, Isiocha & Njoku; 2015) in the current increasing decrease in world oil price and prevailing crisis.

Rice production in Enugu state has thrived in a large scale for more than four decades and has been under serious constraints despite the state's potential to supply the much needed quality rice to south eastern region and beyond. This was evidenced by the establishment of farm settlement in old Uzo-uwani comprising of current Uzo-uwani (Enugu state), and Ayamelum formerly Oyi LGAs (Anambra state). Nnadozie and Ugwu (2008) reported that a large irrigated rice farm was established at Adani in early 1960s, with an increase in cultivable rice fields in 1976 by Nippon Coy. Ltd, Japan which brought in Integrated Rice Mill Equipment yet to be Mounted. In the 1980s the old Anambra state in addition to ADA-rice (Agricultural Development Authority rice project) in conjunction with old Imo state established the Anambra/Imo states World Bank sponsored integrated rice mills at Adani with major technical support from lower Anambra /Imo River Basin Development Authority Omor/Ifite Ogwari and



University of Nigeria, Nsukka. These two states are currently the five south eastern states ; namely – Abia, Anambra, Ebonyi, Enugu and Imo.

However, Ogboko (2015), stated that one of the largest processing rice plants in Nigeria is sited in Enugu state. Accordingly, this also gives credence to the rice production potentials of Enugu state Nigeria as six council areas of Enugu state are significant in rice production which can be harnessed in rice cluster market value chains. These council areas are: Aninri, Ezeagu, Nkanu east, Isi-uzo, Oji-river and Uzo-uwani. Currently , Enugu state is one of the six core participating states with rice value chain as the main focus to support farmers' productivity in order to eliminate totally rice importation in Nigeria , one major thrust of the President Buhari's administration. The Enugu state Fadama III –AF project coordinator, Ogboko (2015), while addressing farmers in Adani ,Uzo-uwani LGA stated that the target of the project is to support farmers to grow agriculture and turn it to a business that will bring about profit and higher return on investment and ensure food security with the establishment of Agricultural Hiring Enterprise Centre(AEHE) to enable farmers access to services.

The main ecologies for rice in Nigeria are rainfed lowland, rainfed upland, irrigated low land, deep water/floating and mangrove swamp .However, the deep water/floating and mangrove swamp support integrated irrigation-aquaculture (IIA) and is only beginning in Nigeria (Miller et al.,2006). Kogbe *et al.* (2000) and Yaro (2000) reported that rice yield from rice-fish culture was more than that from mono-rice culture. Halwart and Gupta (2004), concluded that rice-fish culture is likely to give higher rice yields than mono-rice culture because the rice-fish plots will have less weeds and pests since fish consume some of the weeds and pests. Development of rice-fish farming in Nigeria can be greatly facilitated through use of the irrigation schemes in the country with resultant rural employment, revenues and food security.

The pertinent questions are can this assertion bring succor to farm mechanization and ditto provide a roadmap to the acclaimed PPP(public-private partnership) that was behind the Asian countries' massive economic upturn? What were wrong with earlier federal and state governments' mechanization programmes that did not see the light of the day? What are really the obstacles and or constraints to effective rice farm mechanization and waste land use for fisheries in Nigeria especially in Enugu state with its abundant potentials leading federal government to be spending more than 30 % of its annual budget on Rice importation and 12% on fish?

PROBLEM STATEMENT OF THE STUDY

The rationale of this study is derived from the report of Emedome (1990) , that the dearth of more hands in farming is making Nigerian food production more unpredictable and fraught with high risks and uncertainties characteristics of vagaries of weather, poor agricultural financing, uncoordinated marketing value chains, poor mechanization and youths' apathy towards agriculture . Accordingly, Igwe (2001) observed that growth in agricultural sector base have multiplier effects on national economic development as engine of growth and industrialization. Igwe (2001) concurring with the views of Emedome (1990) , affirmed that no national economy will grow in isolation of the agricultural sector!

Therefore, it is very crucial to involve both the three tiers of governments, non-governmental organizations ; the international communities and donor agencies to galvanize the wheel of group dynamics in prompting/reengineering the zeal of our elites and skilled Nigerians to re write the agricultural *doom to boom* using the REFILS strategy(Nnadozie, 2002; Nnadozie,Ume ,Isiocha & Njoku; 2015). This is possible if we can identify the constraints to effective rice farm mechanization and waste land use for fisheries in Enugu State, Nigeria with a view to increasingly galvanize, resuscitate and stimulate commercialization of rice sub -sector of our food, for man, his livestock, raw materials for our ailing industries and earnings from rice exportation to west African sub -region , Africa and the World while increasing the protein needs of the rural communities . Rice like Nigerian cassava have a greater potential in the national economy(Nnadozie,Ume ,Isiocha & Njoku; 2015).

In order to achieve rapid advancement in our economy, mechanizing the agricultural sector of the economy is a cardinal step (Obasanjo,1987). However ,in a paid advertorial ThisDAY newspaper (2015, Friday November 13,p.12B) ,stated that CBN announced the presidential flag off- of dry season rice and wheat farming at Birnin Kebbi, Kebbi state on Tuesday November 17th ,2015- a financing model for small holder farmers for dry season rice and wheat farming which amounted to N2.6billion. What will be our faith in Enugu state? There is an urgent need to infuse modern farm mechanization into our farming culture and fabrics. It is quite appalling that up till date, Nigeria as a nation among other third world countries still depend on blunt knives and heavy wooden hoes,



with extreme reliance on manual power and use of unimproved mechanized techniques and unimproved fingerlings, breeds of livestock, poor processing/storage, low marketing networks among other unconventional practices that derogate farming as a business(Nnadozie and Ugwu, 2008). There is crucial need to involve our youths in agriculture by enhancing its mechanization (Nnadozie & Ugwu, 2000; Uzoigwe & Nnadozie, 2001; Nnadozie, 2002).

The above scenario has left the nation with its teeming unemployed youth population in a dire search of a means of survival with associated problems of restiveness, armed robbery, hired assassinations, kidnapping, drug abuse, abortion, cult activities, 419ners, boko haram and high numbers of internally displaced persons (IDPs) or distressed humans. Nigeria of over 168 million people, have about 75% of people engaged in farming, yet the poverty index is high (70%) and people are not sure of how, where and when their next meal will be. Government of Nigeria, from first to the present have made successive attempts to better farm mechanization, yet there is not enough statistical evidence to show much sustainable growth in percentage agricultural share of the GDP with a mean annual growth of 3.4 and share total of 39.9% in the regulated period of 1994-1999 (Eboh, Ujah and Nzeh, 2010).

This study tries to evaluate the barriers to achieving effective rice farm mechanization because until rural farmers are relieved of the boredom and tedium in use of traditional techniques and manual labour that is full of drudgery in farming, Nigeria will be dancing in the euphoria of Eldorado. With abundant human resources, we can not fold our hands watching the global economic emancipation of most third world countries amidst her potential international cooperative cost advantage. This work is therefore, a contribution from concerned researchers to give back to society what they got from it in the course of their work experiences and academic pursuits.

PURPOSE/OBJECTIVES OF THE STUDY

The broad purpose of the study was to find out constraints to effective rice farm mechanization in agricultural business in Enugu state, Nigeria. The specific objectives of the study were to:

- i) Describe the various rice farmers mechanization methods in the study area.
- ii) Determine if rice farm mechanization will encourage youths and the use of modern implements by farmers to increase massive rice production in the study area.
- iii) Evaluate if earlier federal and state governments' mechanization programmes between 1970 to 2015 on rice farming were adequate.
- iv) Identify what were the real obstacles or constraints to effective rice farm mechanization and waste land use for fisheries in Enugu state, Nigeria.
- v) Determine possible solutions to the identified constraints to effective rice farm mechanization in Enugu state, Nigeria.

Justification of the study:

A study of this nature as earlier observed has a very wide range of implications due to the indispensability and interdisciplinary nature of agriculture in Nigeria's economic development. State personified by nation comprised the three tiers of government is the first beneficiary of the findings of the study as it will help in rural development policy formulation by this major stake holders to better the lots of peasant farmers in the rural communities of 774 local council areas of Nigeria. Since the findings will x-ray the benefits accruing from improved effective rice farm mechanization and waste lands use for fisheries, it will form the basis for public and private partnership (PPP) in Enugu state specifically and Nigeria at large. A government policy thrust which really wish to engender a high level of growth in economic development must spearhead an effective farm mechanization strategy at all levels.

The rural rice farmers in the state would also benefit greatly as their group dynamics will help them foster posterity through formation of produce associations and cooperative societies which is pivotal to rural industrialization and wealth creation. Core investors would also find the existing gap to apply innovations in the rice market value chains. Greater linkages and strategic grains reserve will provide more rooms for internal and external value added. Once the return on investment in rice is higher, more business opportunities will attract direct foreign investors thereby encouraging export of rice with a reserve of hard currency hitherto used in rice imports. Between 2012 and 2015, Nigeria spent \$2.14 billion on rice importation. This present government is focusing on increased rice by promising all support.



The Nigerian youths will be attracted to various rice production and market value chains to become entrepreneurs and small and medium enterprises would spring up in the rice producing communities in Enugu state to form an emerging rice value chain market clusters. This will reduce over dependence of youth on governments for white collar jobs that are nonexistent. Moreover, agricultural science departments of Nigerian various colleges, polytechnics and universities would find relevance for further studies and practically demonstrate their findings laid waste in libraries over these years. The researchers in Nigerian research institutes would review the work to ensure its applicability and otherwise in the national transformation agenda of the federal republic of Nigeria and accept or add further findings to it. Again, the use of waste lands in the identified area will be a new variant in our rice culture to help farmers increase their protein intake and income apart from rice sales and by products. Finally, it is a contribution to the body of existing knowledge in rice farm mechanization literature.

RESEARCH METHODOLOGY

Research design adopted was descriptive survey method which employed the use of a sample of target population for investigation and the result obtained was interpolated to give a generalized information and result about the larger population. This design has several merits over other research designs and is mostly relied on due to its cost and time value implications (Okonkwo,2014 ; Osuala, 2007).

Enugu state Nigeria is the study area. Enugu is the capital of Enugu state located in south eastern Nigeria . Enugu city alone has a population of 722,664 and the entire state population of 3,257,298 with a land mass of 1069km² (NPC,2006; Anyadike2002 & Wikkipedia, 2008). The state was named after Enugu Ngwo which coal was found in 1909 (enugu- wikipedi, enugu.htm- accessed june,15th 2015). The discovery of coal by the colonial administration of the British which led to the establishment of the Eastern line railway to carry coal from the inland city to port of Port-Harcourt , a city created for this purpose located 151 miles(243km) south of Enugu coal camp. By 1958 Enugu had over 8,000 coal miners. As of 2005 there were no significant coal mining activities left in the state.

Enugu became the capital of old Eastern region on Nigeria's independence ; state creations in 1976 and 1991 led to Enugu becoming the capital of old Anambra and new Enugu States respectively . Industries in the state include urban markets and bottling industries. Enugu has become a preferred filming location for directors of the Nigerian movie industry dubbed '*Nollywood*'. Enugu's main airport is the Akanu Ibiam International Airport. Others are Anambra motor manufacturing company(ANAMMCO), Product Development Authority(PRODA) and Emenite an asbestor coy. Many pharmaceutical companies also exist while some higher educational institutions in Enugu include: Enugu campus of UNN, ESUT, IMT, GOU, CARITAS ,Federal Dental, Federal psychiatrics, National Orthopaedic and other privately owned institutions.

Climatically, Enugu is located in a tropical rain forest zone with a derived savannah. Enugu's climate is humid and its humidity is at its peak between march and November. The mean state daily temperature is 26.7%(80.1^{of}) . Despite its name, Enugu lies at the foot of an escarpment and not a hill. Enugu is located in the Cross river basin and Benue trough and has the best developed coal in Nigeria . Its coordinates are latitudes 5⁰56¹N -7⁰05¹N and longitudes 6⁰53¹E-7⁰55¹E(Wikipedia, 2008). Precambrian basement rock in Enugu is overlaid with sediments bearing coal from cretaceous and tertiary age. Enugu's hills at the extreme may reach an elevation of 1,000 m(3,300ft) while highlands surround Enugu for the most part are underlain by sandstone and lowlands are underlain by shale (Ofomata,1964; Uzoigwe and Nnadozie, 2001).

Sampling and sample frame:

The researchers employed purposive sampling approach to select rice producing council areas in the state. Thus, Aninri, Ezeagu, Nkanu east, Isi-uzo, Oji-river and Uzo-uwani were selected. Thereafter, a simple random sampling was adopted to select 133 rice farmers in each of the selected LGAs which gave a sample size of 798 out of target rice farmers' population of 6,000; while the representatives of the permanent secretary and director in ministry of agriculture were selected to respond to the instrument of data collection. This gave a grand total of 800 respondents used for the study.

Instrumentation :

The researchers used an open ended questionnaire which was validated by an expert in education measurement and evaluation in Enugu State University of Science and Technology before its use. The reliability of the data instrument was 0.82 or 82 % which confirmed its ability to measure consistently what it ought to measure.



Data collection was achieved by use of both primary and secondary sources. The application of oral interview, personal observations, likert attitudinal scale items in questionnaire and focus group discussion (FGD). Two research assistants were trained who helped in administering the questionnaire to the selected farmers in each of the six council areas of the state. This approach gave rise to one hundred percent recovery of administered questionnaire. Three weeks were used in data collection. The first one week was used in sensitization of rice farmers, then at the end of the exercise, the questionnaire were administered while other two weeks were used in collecting completed questionnaire from farmer respondents. The secondary data sources were literature review of related text books, journals, proceedings, technical bulletins, websites and research publications.

Data analysis: This was achieved by use of chi-square(χ^2).

Decision rule: Accept χ^2 if calculated/observed value is greater than the tabulated value.

RESULTS AND DISCUSSION

Research objective (i) sought to describe the various rice farmers' mechanization methods in the study area. Table 1 below revealed that the tabulated χ^2 (4.98) value was greater than calculated χ^2 (3.33) which implies that little rice farm mechanization is practiced in Enugu state.

Table 1: response on rice farm mechanization methods in Enugu state

Response	SA	A	UD	SD	D	TOTAL
Use tractor, threshers mill engines knapsack sprayers	220	250	-	15	20	505
de-stoners / stitchers Rice planters, Combine harvesters Integrated processors Boom sprayers Motorized fert. applicators.	-	10	15	40	230	295
TOTAL	220	260	15	55	250	800

Key : $\chi^2_{tab}=4.98$, $\chi^2_{cal}=3.33$, $\alpha/\alpha=0.05$, D. f= 3. Source : Field survey(2015).

At alpha level ($P<0.05$), the decision was to reject that there is a positive impact of rice farm mechanization in the study area. This corroborates the opinions of Nnadozie and Ugwu (2008), that there is an urgent need to infuse modern farm mechanization into our farming culture and fabrics. It is quite appalling that up till date, Nigeria as a nation among other third world countries still depend on blunt knives and heavy wooden hoes, with extreme reliance on manual power and use for unimproved mechanized techniques and unimproved fingerlings, breeds of livestock, poor processing/storage, low marketing network among other unconventional practices that derogate farming as a business.

Research objective(ii) was to determine if rice farm mechanization will encourage youths and the use of modern implements by farmers to increase massive rice production in Enugu state.

Table 2: response on rice farm mechanization encouraging youths and farmers to increase massive production in Enugu state

Response respondents	SA	A	UD	SD	D	TOTAL
males	220	200	-	10	40	470
females.	180	100	50	-	-	330
TOTAL	400	300	50	10	40	800

Key : $\chi^2_{tab}=4.99$, $\chi^2_{cal}=5.02$, $\alpha/\alpha=0.05$, D. f= 3. Source : Field survey(2015)



Table 2 of the study has shown results on if rice farm mechanization will encourage youths and the use of modern farm implements by farmers to increase massive production in the study area. The calculated X^2 value of 5.02 is greater than tabulated X^2 value of 4.99 at $P > 0.05$. The decision rule is that rice farm mechanization will encourage youths and use of modern farm implements in massive food production in Enugu state, Nigeria. This finding agreed with Ogboke (2015), while addressing farmers in Adani, Uzo-uwani LGA, Enugu State, Nigeria; agreed that the target of Fadama III-AF project is to support farmers to grow agriculture and turn it to a business that will bring about profit and higher return on investment and ensure food security with the establishment of Agricultural Hiring Enterprise Centre (AEHE) to enable farmers access to services.

The study objective (iii) was to evaluate if earlier federal and state governments' mechanization programmes between 1970 to 2015 on rice farming were adequate. The results were shown in table 3 and it reveals that calculated (X^2_{cal}) 2.97 value was lower than the tabulated value (X^2_{tab}) of 4.98, and implies that the decision rule was to reject and conclude that federal and state governments' rice farm mechanization programmes between 1970 and 2015 were not adequate in Enugu state, Nigeria.

This finding was similar to observations by Eboh, Ujah, and Nzeh (2010) that government of Nigeria, from first to the present have made successive attempts to better farm mechanization, yet there is not enough statistical evidence to show much sustainable growth in percentage agricultural share of the GDP with a mean annual growth of 3.4 and share total of 39.9% in the regulated period of 1994-1999.

Table 3: if federal and state governments' rice farm mechanization programmes between 1970 and 2015 were adequate in Enugu state

Response	SA	A	UD	SD	D	TOTAL
adequate	80	100	-	10	40	230
<u>inadequate</u>	<u>220</u>	<u>150</u>	<u>150</u>	<u>-</u>	<u>50</u>	<u>570</u>
<u>TOTAL</u>	<u>400</u>	<u>300</u>	<u>50</u>	<u>10</u>	<u>40</u>	<u>800</u>

Key : $X^2_{tab} = 4.98$, $X^2_{cal} = 2.97$, $\alpha/\alpha = 0.05$, D. f = 3. Source : Field survey (2015).

Table 4 below presents the results of objective (iv) of the Study. Objective (iv) of the research was to identify what were the real obstacles or constraints to effective rice farm mechanization in Enugu state, Nigeria. The result showed that there are several identified constraints to effective rice farm mechanization in Enugu state, Nigeria. This is supported by the result of table 4 with X^2 tabulated value (4.99) lower than X^2 calculated value (5.03) at $\alpha/\alpha = 0.05$. It therefore, implies that we accept that constraints to rice farm mechanization have significant effects on rice production in Enugu state. This findings agreed with earlier study of Nwobiala and Nnadozie (2014) quoting Doss (2003) argued that adoption of improved technologies will not improve food security and reduce poverty if barriers to their continued use are not overcome.

Table 4: response on constraint to effective rice farm mechanization in Enugu state, Nigeria.

Response	SA	A	UD	SD	D	TOTAL
Use of: manual threshers & labour, old mill engines, knapsack sprayers	-	50	35	-	-	85
lack of : irrigation facilities, farm credits/ fisheries in waste land de-stoners / stitchers Rice planters, Boom sprayers Combine harvesters Integrated processors						



Motorized fert. applicators.	291	280	130	-	14	-	715
TOTAL	291	330	165	-	14	-	800

Key : $X^2_{tab}=4.99$, $X^2_{cal}=5.03$, $\alpha/\alpha =0.05$, D. f= 3. Source : Field survey(2015).

The results of objective (v) of the study were as shown in table 5. The study objective (v) was to determine possible solutions to the identified constraints to effective rice farm mechanization in Enugu state, Nigeria. The result of table 5 have shown that X^2 tabulated value(4.99) is smaller than X^2 calculated value (5.93)at an α/α (0.05) level. This implies that if all the identified solutions are religiously and thematically approached the impact on effective rice farm mechanization in Enugu state, Nigeria , will be significantly higher with a more value added and high return on investment(ROI). The result concurred with earlier observation by Nnadozie and Ugwu(2008), that in rural areas where commerce and industry are not well developed with low industrial clusters, and their population growth rate is high while their per capita income is low and more than 75% of them are engaged in farming, agricultural modernization may be seen as the corner stone or pillar for both rural and urban development via job and wealth creation especially in the era of youth unemployment as in Nigeria.

The inference shows that based on the empirical results and evidence, Nigerian governments and all stake holders have not impacted greatly on rice farm mechanization , ditto agriculture and there must be a rethink if this ugly trend must change.

Table 5: solutions to identified constraints to effective rice farm mechanization in Enugu state, Nigeria .

Response	SA	A	UD	SD	D	TOTAL
Use of: manual threshers& labour, old mill engines, knapsack sprayers	-	50	35	-	-	85
use of these: improved extension serv. irrigation facilities, farm credits. de-stoners / stitching device, Rice planters, Combine harvesters Integrated processors Boom sprayers						
Motorized fert. applicators.	291	280	130	-	14	715
TOTAL	291	330	165	-	14	800

Key : $X^2_{tab}=4.99$, $X^2_{cal}=5.93$, $\alpha/\alpha =0.05$, D. f= 3. Source : Field survey(2015).

CONCLUSION

Based on the findings of the study, the researchers concluded that there are several constraints to rice farm mechanization in Enugu state, Nigeria. These include; use of manual threshers, labour, old mill engines, knapsack sprayers and other crude farm implements. Others are lack of improved extension services, irrigation facilities, farm credits, de-stoners / stitching devices, rice planters, combine harvesters , integrated processors boom sprayers, motorized fertilizer applicators. The situation is that much effort is wasted and output is lower than expected. Thus , low labour productivity and low return on investment.

RECOMMENDATIONS

Based on the findings of the study , the researchers recommended the following:

1. There is an urgent need to infuse modern farm mechanization into our farming culture and fabrics. It is quite appalling that up till date, Nigeria as a nation among other third world countries still depend on blunt knives and heavy wooden hoes, with extreme reliance on manual power and use for unimproved



mechanized techniques and unimproved fingerlings, breeds of livestock, poor processing/storage, low marketing network among other unconventional practices that derogate farming as a business.

2. The solutions among others is that agriculture modernization is the corner stone of rural and urban development through job and wealth creation, and higher return on investment (ROI) in agriculture.
3. Government at all levels and major stake holders in rice sub sector should ensure that there is the use of improved extension service delivery, irrigation facilities, farm credits, de-stoners / stitching devices, Rice planters, combine harvesters, Integrated processors, Boom sprayers and motorized fertilizer applicator to make rice farming enticing and attractive to the youths with a higher productivity.
4. The waste land should be used for fish culture to increase rice farmers' source of income and protein.
5. Rice farming clusters should be provided with rural infrastructures to make lives worth living and reduce rural-urban youth drifts.
6. There should also be rice processing and export zone in the state to add value to rice marketing value chain in Enugu state.

It is the belief of the authors that if these recommendations are enforced by all stake holders in rice production and marketing, the rice enterprise will be more rewarding with higher impact on the state and Nigeria economy.

REFERENCES

1. ACHEBE, C (1985). Trouble with Nigeria. Enugu: Fourth Dimension Publishers.
2. ARMON, R (1989). Agricultural Mechanization and Advancement. London: Kihz Waltz Press.
3. CHUKWUEMEKA, E (1998). National Development Through Agricultural Investments. Onitsha: Man-Joe Publishers.
4. EBOH, E.C; KALU, K.O; ACHIKE, A.I; UJAH, O.C; AMAKOM, U.S; ODUH, M.O; NZEH, C.E.P & LARSEN, B.K (2006). Renewable Natural Resources, Sustainable Economic Growth & Poverty Reduction in Nigeria. African Institute for Applied Economics Research Paper No 1. ISSN 0794-4187, Enugu, Nigeria
5. EMEDOME, N (1990). Agro-industries in Economic Development. Nsukka: Topmost Publishers.
6. EZEALI, E.A (1990). Basic Paths to Development in Developing Nations. Awka: Ikenga Publishers.
7. FRIDAY, O. & EDDY, O. (2013). Empirical Analysis of Factors Affecting Productivity Among Fadama Farmers in Edo South Zone, Edo state, Nigeria. International Journal of Advancements Research & Technology. Vol. 2(2)201-211.
8. GANSALLO (2000). Introduction of rice-fish culture into farming systems in Lagos State. SW Zone Annual Report of Fisheries on Farm Adapted Research, Lagos State, Nigeria, pp: 11-17.
9. GOMNA, A.K., YARO, I. & LAMAI, S.L. (2000). Evaluation of the growth performance yield and survival of *Oreochromis niloticus* at different stocking densities in rice-cum-fish culture system. *Journal of Science, Technology and Mathematics Education (JOSTMED)* 3(1): 149-155.
10. HALWART, M. AND M.V. GUPTA, (2004). Culture of fish in rice fields. FAO and the WorldFish Center, Rome, Italy, pp: 83
11. HENRY, B; BEN, C MAUREEN, M & CHARLOTTE, M (1990). The Food Question? Profits versus People. London: Earthcan Publication.
12. IGWE, A (1990) Agriculture and Economic Development. Nsukka: God deeds Printing press.
13. IGWE, A (2001). Self-reliant Economy for all in the years ahead. Nsukka: Jobus International.
14. KOGBE, J.S.O., O.T. RAMLAFA, I.A. SAEED, K.O. OGONYINKA AND A.I. GANSALLO (2000). Introduction of rice-fish culture into farming systems in Lagos State. SW Zone Annual Report of Fisheries on Farm Adapted Research, Lagos State, Nigeria, pp: 11-17.
15. MILLER, J., ATANDA, T., ASALA, G. & CHEN, W.H. (2006). Integrated irrigation-aquaculture opportunities in Nigeria: the Special Programme for Food Security and rice fish farming in Nigeria. In M. Halwart & A.A. van Dam, eds. *Integrated irrigation and aquaculture in West Africa: concepts, practices and potential*, pp. 117-124. Rome, FAO. 181pp.
16. NNADOZIE A.K.O & UGWU D.S (2000). The Role of Children in Environmental Protection in South Eastern Nigeria; 3rd National Research Network Ciap Enugu. CIAP Press (P 66-78).
17. NNADOZIE A.K.O (2002). Youth Organization in Agrisc as a link towards the Millennium Functional Education in Nigeria. Nig Journal of Education Vol. 2 (1) 32-37.
18. NNADOZIE A.K.O & UZOIGWE J.I. (2002). Effectiveness of Local sanctions on Agricultural Loan Recovery Under Community banking in Enugu State. Journal of Sc of Agric, Food Tech & Environment Vol. 2 P 56 - 62.



19. NNADOZIE A.K.O, & ONWUBUYA E.A. (2003). Income generation activities by Youths in rural markets of Enugu & Anambra States. *Lagos Journal of Child & Youth Development* Vol. 1 (1) 59-64.
20. NNADOZIE A.K.O & UGWU D.S (2008). The involvement of Small Holder Private farm Sector in Agriculture in Uzo-Uwani L.G.A, Enugu State, Nigeria, *Journal of Agricultural Research and Policies*. Vol 3 (2) (Pp 1 -5).
21. NNADOZIE A.K.O & ONWUBUYA E.A. (2009). Effect of various levels of Phosphorus Fertilizer on the Grain yield of Rice in Kuru, Jos Plateau State Nig. International Ass of Research Scholars and Fellows IARSAF, IITA, Ibadan. (Pp 77 Book of Abstract).
22. NNADOZIE, A.K.O & IYI E.A. (2009). Dry Season Irrigating Farms by Small holder in Enugu Municipality. The physical planning implication. *Journal of Environmental Design* JED Vol. 4 No 1 & 2 (P 21-24).
23. NNADOZIE, A.K.O; UME.S.I & EMEHUTE, V.C (2015). Role of Transportation and Marketing in Enhancing Agricultural Production in Ikwo L.G.A, Ebonyi State Nigeria. *Proceedings of the 59th Annual conference of Association of Deans of Agriculture in Nigerian Universities (ADAN)*, Abakaliki. p27-37.
24. NNADOZIE, A.K.O.; NWAOBIALA, C.U & MKPADO .M.C (2015). An Evaluation of Research-Extension-Farmer-Input-Linkage-System (REFILS) by Agricultural Development Programme (ADPs) in Nigeria. *Book of Readings. Department of Rural Sociology and Extension, Michael Okpara University of Agriculture, Umudike.*
25. NNADOZIE A.K.O., UME S.I., ISIOCHA S. & NJOKU I.A (2015). Extension Farmer – Input Linkage System (REFILS) by Agricultural Development Programmes (ADPs) in Nigeria, 1986-2011. *Science Journal of Business Management : Special Issue: Sustainable Entrepreneurial Developments in Agribusiness. Vol.3no5-1pp41-46.*
(<http://www.sciencepublicationgroup.com/j/sjbm/doi10.11648/j.sjbm.s.20150305> 019.
26. NNADOZIE A.K.O., UME S.I., ISIOCHA S. & NJOKU I.A (2015). Nigerian Cassava Potentials in National Economic Development. *Science Journal of Business Management: Special Issue: Sustainable Entrepreneurial Developments in Agribusiness. Vol.3no5-1 pp47-49.*
(<http://www.sciencepublicationgroup.com/j/sjbm/doi10.11648/j.sjbm.s.2015030501.20>.
27. NWAOBIALA, C.U. & NNADOZIE, A.K.O. (2014). Adoption Determinants and Profitability Analysis of Okra Farming in Awgu L.G.A. of Enugu state, Nigeria. *Journal of Applied Agricultural Research. ARCN.vol.(2).P.117.*
28. NWAOBIALA, C.U & A.K.O. NNADOZIE (2014). Adoption and Profitability Analysis of Okra farming in Enugu State, Nigeria. *International journal of Agricultural Economics, Management and Development*. Vol.4(1).P.39.
29. NWEKE, J (2009). *Industrialization of the Economy*. Abakaliki: Umeh Publishing Company.
30. OBASANJO, O. (1987) *Africa Embattled*. Abeokuta: Ota Press.
31. OBI, N. (1999). *Indigenization and Privatization Policies In Nigeria*. Enugu: Calex Publishers.
32. OGBOKE, J. (2015). Rice Value Chain: A Thriving Business in Enugu State. *Fadama III- AF News 4th Edition*, July p.7. www.fadamaaf.net.
33. OKONWO, C. (2014). *Statistics and Research Methods for Schools and Colleges*. Onitsha: Africana Academic Books
34. OSUALA, E.C. (2007). *Introduction to Research Methodology*. Nimo: Rex Charles & Patrick Ltd.
35. ORUKA, B. (2012). *Mechanization and Development*. Igbo-ukwu: Nwobison Publishers.
36. UGWU D.S, NZEHE C P, & AMAKOM U. (2013). Agriculture as a Potent Economic Growth Driver for Nigeria Economy. *Afri -Heritage Research Working Paper -03*.
37. UGWUOKE, F.O; NJOKU F.C.M & ONU D.O (2005). Constraints to Self –employment in Farming: Case of Participants in the Agricultural Programme in Enugu State: *Proceedings of the 39th Conference of the Agricultural Society of Nigeria*. P316- 318.
38. UME S.I, N.O EDE, N.C. ONU, J. NDUKAUBA & NNADOZIE A.K.O (2013). Economics of Swamp Rice Production in Afikpo North L.G.A of Ebonyi State. *Proceedings of the 47th Annual Conference of the Agricultural Society of Nigeria*. Ibadan .p.604.
39. UME S.I, N.O EDE, N.C ONUH, J. NDUKAUBA & NNADOZIE A.K.O (2013). Factors Determining the Adoption of Recommended Cocoyam Production Technologies in Owerri West L.G.A, Imo State. *Proceedings of the 47th Annual Conference of Agricultural Society of Nigeria*. Ibadan.p.638
40. UMEZUE, J. (2009). *The Base for National Growth , an In-depth Study of Agricultural Policies in Nigeria*. Enugu: Dona Printing Press.



41. UZOIGWE J.I & NNADOZIE A.K.O (2001). Soil Conservation for Children in Agric Prog. in Enugu State Nig; 4th Nat Research Network Ciap. Makurdi (P. 253 – 259).
42. WIKIPEDIA(2008) . Enugu State ENUDNEN Flight and Airport Guide: Retrieved on 8th Aug. from <http://www.airportfact.com/c11026-ENU-DNEN-enugu-Enugu State.html>.
43. WORLD BANK (2013). Agriculture and its Contributions to Nigeria's Growth. Washington D C.

AUTHORS AFFILIATES

NNADOZIE, A.K.O (Ph. D, FIIA) is Head, Marketing Department, and lecturer cum researcher with several years of working experience in both public and private sectors that were involved in rice production. In 1987. Dr. Nnadozie worked as an agriculture assistant in Adarice Production Nigeria, Ltd. Adani , Uzo- uwani L.GA; where he later rose to rank of Plantation manager in April, 1993 before joining the state Agricultural Development Programme (ENADEP) as an agricultural extension agent. He later became subject matter specialist in charge of agro-forestry Enugu east zone in 2007 which made him attend several trainings by FAO/FGN. Dr Nnadozie was part of the implementation team of Enugu state FAO/FGN National Special Food Security Programme in Amagunze Nkanu East L.G.A site 1 (2002_2007). He later rose to rank of chief Agricultural officer in charge of groups and business management under the sub –programme Rural Institutions Development(RID), a post he held before he left the state Ministry of Agriculture as a Deputy Director. Dr. Nnadozie had added wealth of experience having served as a contract facilitator with CBN/UNN/CEDR entrepreneurship development centre at Onitsha for the South east and South south and later was a member of Transition Committee Member of the CBN/UNN/CEDR in 2010-2011, before he was re –contracted to Head the Training and Micro Enterprise of the centre. However , he relinquished this juicy position to take up appointment as lecturer because of his interest to work with the grass root. Dr Nnadozie have earlier coordinated students' research projects and seminars in Agricultural Extension and Management and headed Business Administration and Management Departments respectively. In recognition of his academic contributions , the Nigeria Institute of Industrial Administration in 2014 conferred on him FELLOW Institute of Industrial Administration(FIIA). Dr . Nnadozie has widely published in National and international journals ,attended several organized public debates and fora in Nigeria, and intends to rededicate his present research works to Public policies that will engender better living standards for rural Nigerians that produce the bulk of what we Nigerians eat.

OYEDIRAN, Ajiboye Gabriel is a lecturer in the Department of Fisheries Technology and also the Project Manager Fish Production Unit, Federal College of Agriculture Ishiagu, Ebonyi State, Nigeria. His professional experience is over 15 years in the areas of fish farming and environmental consultancy.

His higher educational career started in University of Agriculture, Abeokuta Nigeria where he was honored with a BSc in Biological Sciences (Zoology) with special focus on fish nutrition and later proceeded to for a M.Sc Hydrobiology and Fisheries in University of Ibadan, Ibadan, Nigeria, his is currently on a Ph.D in the same University. His inclination to research began in Department of Biology, Federal College of Education, Kontagora, Niger State where he served as an Assistant lecturer between 2001 and 2002 after which he has been involved in fish farm consultancy with several establishments. He has worked as an aqua-culturist for foremost reputable fish farms in Nigeria which include Zartech Nigeria Ltd (Fish farm Division) Ibadan, Oyo State and Department of Fisheries of Oyo State Ministry of Agriculture and Natural Resources, Apitipiti, Oyo Town.'Boye has been involved as a resource person in fish farming empowerment programs for religious, private and public organizations, the recent was a Vocational Empowerment/Training of Youths and Women in Fish Production Processing and Packaging 'Tackling the Food Security Challenge' Federal Ministry of Agriculture and Rural Development in Conjunction with Federal College of Agriculture, Ishiagu, Ebonyi State in August,2014.

His research interests are in aquaculture/fisheries management, aquatic toxicology, limnology and general aquatic ecology, he has gotten a series of publications in all these areas. 'Boye is a professional member of Fisheries Society of Nigeria(FISON) and a full member of Society for Environmental Toxicology & Pollution mitigation (SETPOM).He is also an examiner to National Business and Technical examination(NABTEB).His Hobbies include art works collection, travelling and game viewing.

NJOUKU I.A is a lecturer in and research fellow, Department of Marketing. During his NYSC, his primary assignment took him to Oyo State College of Education where he Developed flair for scientific based research. He is a member of Nigerian Institute of Management –Chartered. He is currently devoted to research issues bordering on developmental research and poverty eradication advocacy.



NOMEH A.O. is a lecturer cum researcher in department of Marketing. He has taught several courses in statistics, marketing and Economics. Currently, he is the Departmental Students' research Project coordinator and have conducted scientific seminar guidelines for the final year students of the Department. This exposed him to other peer reviewed research and helped in broadening his knowledge in the field of operational research.